OPERATING INSTRUCTIONS

CLV65x
Bar Code Scanner

Advanced Line

SICK
Sensor Intelligence.

Software Versions

Software/Tool	Function	Version
Bar code scanner CLV65x	SICK firmware	V 3.00
Device Description CLV65x	Device-specific software module for SOPAS-ET configuration software	From v 3.00
SOPAS-ET	Configuration software	From v 2.20

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Figures and Tables

Abbreviations

CAN	**C**ontrolled **A**rea **N**etwork (field bus protocol based on the CAN bus)
CDB	**C**onnection **D**evice **B**asic
CDM	**C**onnection **D**evice **M**odular
CE	**C**ommunauté **E**uropéenne. European Community
CLV	**C**ode-**L**eser **V**-Prinzip (Code reader V princible)
CMC	**C**onnection **M**odule **C**loning
CMD	**C**onnection **M**odule **D**evice
CMF	**C**onnection **M**odule **F**ieldbus
CMP	**C**onnection **M**odule **P**ower
CW	**C**ode**w**inkel (code angle)
DOF	**D**epth **O**f **F**ield
ESD	**E**lectro-**S**tatic-**D**ischarge
HTML	**H**yper **T**ext **M**arkup **L**anguage
I	**I**nput
LED	**L**ight **E**mitting **D**iode
LPS	**L**imited **P**ower **S**upply
MAC	**M**edium **A**ccess **C**ontrol
MTTF	**M**ean **T**ime **T**o **F**ailure
MTTR	**M**ean **T**ime **T**o **R**epair
O	**O**utput
PROM	**P**rogrammable **R**ead **O**nly **M**emory
RA	**R**eading **A**ngle
RAM	**R**andom **A**cces **M**emory
ROM	**R**ead **O**nly **M**emory
RTF	**R**ich **T**ext **F**ormat (standardised document format with format description)
SD	**S**ecure **D**igital
SMART	**S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology
SOPAS-ET	**S**ICK **O**pen **P**ortal for **A**pplication and **S**ystems **E**ngineering **T**ool (PC software for Windows for configuring the bar code scanner)
PLC	**P**rogammable **L**ogic **C**ontroller
TCP/IP	**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol

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1 Notes on this document

1.1 Purpose

This document provides instructions for technical staff on the installation and operation of the bar code scanner series CLV65x with autofocus in the following versions:

- Line scanner / line scanner with oscillating mirror
- With front / side reading window (oscillating mirror)
- With cable and connector (standard version) / with connector unit (Ethernet version)

A summary of all device versions is shown in *chapter 4.3 Device versions, page 26*.

This document contains the following information:

- Installation
- Electrical installation
- Startup and configuration
- Maintenance
- Troubleshooting
- Replacing the bar code scanner

A step-by-step approach is taken for all tasks.

1.2 Target group

The traget group of this document is persons assigned the following tasks:

Tasks	Target group
Installation, electrical installation, maintenance, replacing the device	Qualified staff, e.g. service technicians and factory electricians
Startup and configuration	Trained staff, e.g. technicians or engineers
Operation of the conveyor system	Qualified staff for start-up and operation of the conveyor system

Tab. 1-1: Target group

1.3 Depth of information

This document contains all the required information for installation, electrical installation and operation of the bar code scanner at the installation location. The **factory default setting** (basic configuration) of the bar code scanner is prepared for the use as a **stand-alone device**.

Configuration of the bar code scanner for the **application-specific reading conditions** and operation is carried out using the SOPAS-ET configuration software on a Windows™ PC. The SOPAS-ET configuration software contains an online help system to facilitate configuration.

Important Further information about the design of the bar code scanner as well as the bar code technology is available from SICK AG, Auto Ident division.

On the Internet at **www.sick.com**.

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1.4 Used symbols

To gain easier access, some information in this documentation is emphasised as follows:

NOTICE

Notice!

Indicates a potential risk of damage or impair on the functionality of the bar code scanner or other devices.

➢ Carefully read and follow the notices!

⚠ WARNING

Warning notice!

A warning notice indicates real or potential danger. This should protect you against accidents.

The safety symbol next to the warning notice indicates why there is a risk of accident, e. g. due to electricity. The warning levels (DANGER, WARNING, CAUTION) indicate the seriousness of the risk.

➢ Carefully read and follow the warning notices!

Reference	Italic script denotes a reference to further information.
Important	This important note informs you about specific features.
Explanation	An explanation provides background knowledge of technical nature.
Recommendation	A recommendation helps you to carry out tasks correctly.
TIP	A tip explains setting options in the SOPAS-ET configuration software.
PROJECT	This type of script denotes a term in the user interface in the SOPAS-ET configuration software.
	A symbol indicates a button in the user interface of the SOPAS-ET configuration software.
➢	There is a procedure which needs to be carried out. This symbol indicates operational instructions which only contain one operational step or operational steps in warning notices which do not have to be followed in any particular order. Operational instructions comprising several steps are denoted using consecutive numbers.
⇨	This symbol indicates a reference to other information in the glossary.

This symbol denotes a section in which the operation steps with the SOPAS-ET configuration software are described.

This symbol indicates supplementary technical documentation.

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2 Safety information

This chapter deals with your safety and operator safety in the operational area.

➢ Read this chapter carefully **before** using the bar code scanner.

2.1 Authorised users

For correct and safe functioning, the bar code scanner must be installed, operated and maintained by sufficiently qualified staff.

Important **Repairs to the bar code scanner should only be carried out by qualified and authorised SICK AG service staff.**

➢ The operating instructions should be made available to the end user.

➢ The end user should be briefed and urged to read the operating instructions by the technicians.

The following qualifications are required for different activities:

Tasks	Qualification
Installation, maintenance	• Practical technical training • Knowledge of current health and safety regulations at the workplace
Electrical installation, device replacement	• Practical electrical training • Knowledge of current electrical safety regulations • Knowledge of start-up and operation of the device in each operational area (e. g. conveyor system)
Startup and configuration	• Basic knowledge of the Windows™ operating system • Basic knowledge of designing and setting up (addressing) Ethernet connections for connecting the bar code system to the Ethernet • Basic knowledge of working with an HTML browser (e. g. Internet Explorer™) for using the online help • Basic knowledge of data transfer • Basic knowledge of bar code technology
Operation of the device in each operational area	• Knowledge of start-up and operation of the device in each operational area (e. g. conveyor system) • Knowledge of the software and hardware environment in each operational area (e. g. conveyor system)

Tab. 2-1: Required qualification for starting up the bar code scanner

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2.2 Intended use

The CLV65x bar code scanner is an intelligent sensor for the automatic recognition and decoding of bar codes on objects e.g. in a conveyor system.

The intended use of the bar code system results from the following description of the function:

- In a reading station, the bar code scanner is installed in a holder, either on the side of a conveyor system (side reading) or above it (reading from above).
- The bar code scanner transfers the reading data via the host interface to a superordinate host computer for further processing.
- The bar code scanner is configured/operated using the SOPAS-ET configuration software that runs on a standard client PC provided by the customer. Communication takes place using RS-232 or Ethernet.

Important Any warranty claims against SICK AG shall be deemed invalid in case of changes to the bar code scanner, such as opening the housing, this includes modifications during installation and electrical installation or changes to the SICK software.

The bar code scanner is only to be operated in ambient air temperature limit.

2.3 General safety precautions and protection measures

➢ Read the general safety precautions thoroughly and observe them during all bar code scanner activities. Also observe the warning notices above the operational instructions of each chapter.

2.3.1 Electrical installation work

UL certification

The CLV65x bar code scanner is certified according to UL60950-1 with the following requirements:

- Power supply by LPS or Class-2 power supply unit
- Use SICK connection cables (category AVL V2 according to UL 758) with a length of up to 3 m (9.84 ft)

The certification applies for devices with appropriate marking on the type plate. The enclosure rating (IP) is not UL certified.

⚠ WARNING

Risk of injuries due to electrical current!

The optional power supply module CMP400/CMP490 is connected to the power supply (100 ... 250 V AC/50 ... 60 Hz).

➢ Observe current safety regulations when working with electrical equipment.

Important Electrical installation must be performed by qualified staff.

Connect or release current linkages only under de-energised conditions.

Wire cross sections and their correct shields have to be selected and implemented according to valid engineering standards.

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2.3.2 Laser radiation of the bar code scanner

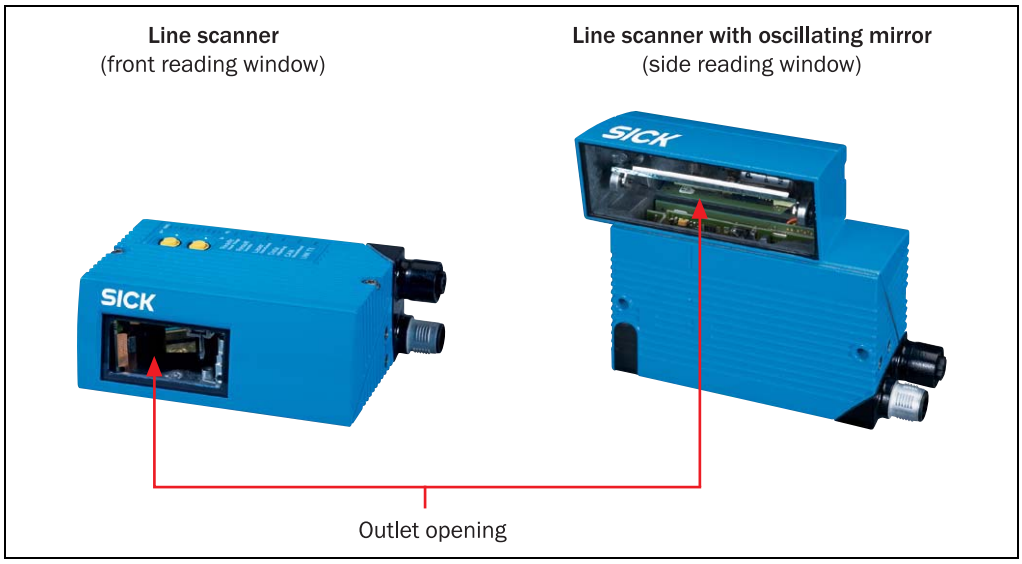

Fig. 2-1: Outlet opening of the laser radiation at the reading window (shown here: Ethernet version)

⚠ WARNING

Damage to the eyes through laser radiation!

The bar code scanner operates with a red light laser of class 2. Looking at the laser's light path for a longer period of time can damage the eye's retina.

The entire reading window is the LED radiation outlet opening.

Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- ➢ Never look directly into the light path (similar to sun light).
- ➢ Never direct the device's laser beam at the eyes of persons.
- ➢ When installing and aligning the bar code scanner, avoid laser beam reflections from reflective surfaces.
- ➢ Do not open the housing. (Opening does not interrupt the activation of the laser diode by the reading pulsing.)
- ➢ Always observe the latest valid version of laser protection regulations.

Important Bar code scanners in series CLV65x operate with a laser of wavelength λ = 658 nm (red light). The radiation emitted is not harmful to human skin.

The product is classified in laser class 2 (laser class II) in accordance with EN 60825-1, IEC 60825-1 and 21 CFR 1040.10 (see the warning sign on the device for the date of publication)

Maintenance is not required to ensure compliance with laser class 2.

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The bar code scanner displays a black and yellow laser warning sign.

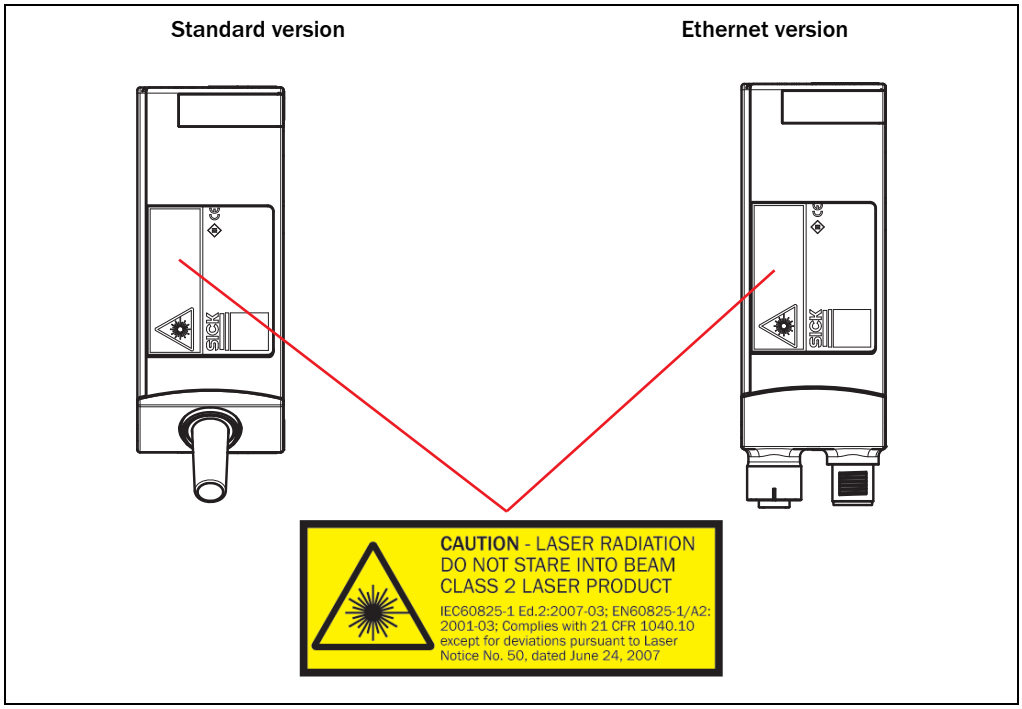
Standard version
Ethernet version
CAUTION - LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
IEC60825-1 Ed.2:2007-03; EN60825-1/A2:
2001-03; Complies with 21 CFR 1040.10
except for deviations pursuant to Laser
Notice No. 50, dated June 24, 2007

Fig. 2-2: Laser warning sign attached to the bar code scanner at delivery

Device	CLV650	CLV651
Laser out radiation (maximum/average)	7.0 mW/ <1.0 mW	4.5 mW/ <1.0 mW
Emitted wavelength	658 nm	658 nm
Pulse duration	< 80 µs	< 80 µs

Tab. 2-2: Laser data of CLV65x

Important If the bar code scanner is installed in a machine/panelling in such a way that the bar code scanner's laser warning sign is hidden, additional warning signs in the same language (not included in delivery) have to be attached to the machine next to the outlet opening of the laser radiation!

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The bar code scanner works as follows in controlling the laser diodes:

- The bar code scanner has monitoring switches that deactivate the laser diode if irregularities occur in the radiation emission.
- The reading pulse (pulse source) controls the on and off mechanism of the laser diode during the reading process.
- During reading operation with "Sensor" and "Command" reading pulses, each time level (laser timeout) switches off the laser diode automatically after 10 minutes (default settings) when a permanent reading pulse has been started. However, it does not stop the reading pulse.

  The reading pulse can be stopped via an appropriate clock signal. The successive reading pulse switches on the laser diode.
- In SOPAS-ET on the "Illumination control" tab you can set or deactivate the laser timeout within a range of 1 ... 1,500 min (= 25h).
- "Laser" LED:

  During normal reading operation the "Laser" LED lights up when the laser diode is switched on.

  When calling up functions via the two buttons of the bar code scanner (aborting normal reading operation), the LEDs have got additional display functions. The "Laser" LED will differ from its original function. It is possible that the "Laser" LED is flashing when Autosetup is selected, although the laser diode is still switched off or the laser diode is switched on, for example, in diagnostic mode (Read Diagn) and the "Laser" LED, however, is not flashing.

2.4 Quick stop and quick restart

The bar code scanner can be switched on or off using the main switch for connection modules CDB620 or CDM420.

2.4.1 Switching off the bar code scanner

➢ Switch off the power supply to the bar code scanner (the connection module)

- or -

Remove (pull out) the 15-pole D-Sub-HD connector of the bar code scanner's connection cable from the connection module.

When the bar code scanner is switched off, the following data is lost:

- Application-specific parameter sets in the bar code scanner that were only saved **temporarily** in the device
- The last reading result of the bar code scanner
- Daily operating hours counter of the bar code scanner

2.4.2 Switching the bar code scanner back on

➢ Switch the power supply to the bar code scanner (the connection module) back on

- or -

Connect the 15-pole D-Sub-HD connector of the bar code scanner's connection cable to the connection module.

The bar code scanner starts up using the most recent **permanently** saved configuration. The daily operating hours counter is reset.

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2.5 Environmental information

The bar code scanner has been constructed with minimum environmental pollution in mind. Excluding the housing, the bar code scanner does not contain any materials using silicone.

2.5.1 Energy requirement

The bar code scanner series CLV65x consumes the following energy:

- Line scanner: Typically 8.5 W with 18 ... 30 V DC
- Line scanner with oscillating mirror: Typically 9.5 W with 18 ... 30 V DC

All values with unwired switching outputs.

2.5.2 Dispose of the device after decommissioning

SICK AG will not currently accept the return of any devices which can no longer be operated or repaired.

➢ Inoperable or irreparable devices must be disposed of in an environmentally friendly manner and in accordance with valid country-specific waste disposal guidelines.

The design of the bar code scanner allows for its separation as recyclable secondary raw materials and hazardous waste (electronic scrap).

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3 Quick-Start

3.1 Preparing the bar code scanner for the quick start

The bar code scanner can be operated quickly and easily using the supplied SOPAS-ET configuration software.

The software offers the following options, among others:

- Fast connection with the bar code scanner
- Configuration of the most important reading parameters and display of the reading results on **one** register tab in the configuration software

System requirements for using the SOPAS-ET configuration software

See *chapter 7.2.2 System requirements for the SOPAS-ET configuration software, page 68*.

Additional accessories required (not in delivery)

- Connection module CDB620 or CDM420
- For the Ethernet version of the bar code scanner: Connection cable for data and function interfaces (see ordering information for " Bar Code Scanner CLV600" product information)
- 3-wire RS-232 data cable (null modem cable no. 2014054)

  - or -

  To connect an Ethernet version of the bar code scanner to the PC's Ethernet interface: relevant cable (see ordering information for " Bar Code Scanner CLV600" product information)

An overview of in-stock cables is available in the "Bar Code Scanner CLV600" product information (see *chapter 11.5 Supplementary documentation, page 113*).

Perform an electrical connection to the bar code scanner

1. Connect the bar code scanner to connection module CDB620/CDM420.
2. Switch on the power supply for CDB620/CDM420.
3. Switch on the PC for the configuration and install and start the supplied SOPAS-ET configuration software.
4. Connect the bar code scanner.

   To achieve this, connect the PC using a 3-wire RS-232 data cable (null modem cable) to the "Aux“ connection in CDB620/CDM420.

   - or -

   Connect the PC to the bar code scanner's Ethernet interface (Ethernet version).

For detailed instructions, see *chapter 5 Installation, page 43* and *chapter 6 Electrical installation, page 53*.

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3.2 Establishing connection with the bar code scanner

➢ Communicate with the bar code scanner according to the selected data interface (RS-232 or Ethernet) (see *chapter 7.3 Establish communication with the bar code scanner, page 68*) and perform a scan.

TIP To establish a connection quickly and easily via Ethernet, the SOPAS-ET configuration software has a CONNECTION WIZARD in the TOOLS menu.

3.3 Performing the reading

For the SOPAS-ET configuration software, the QUICKSTART register tab contains the most important reading parameters for configuring and performing a bar code reading:

PROJECT TREE, CLV65X, QUICKSTART register tab.

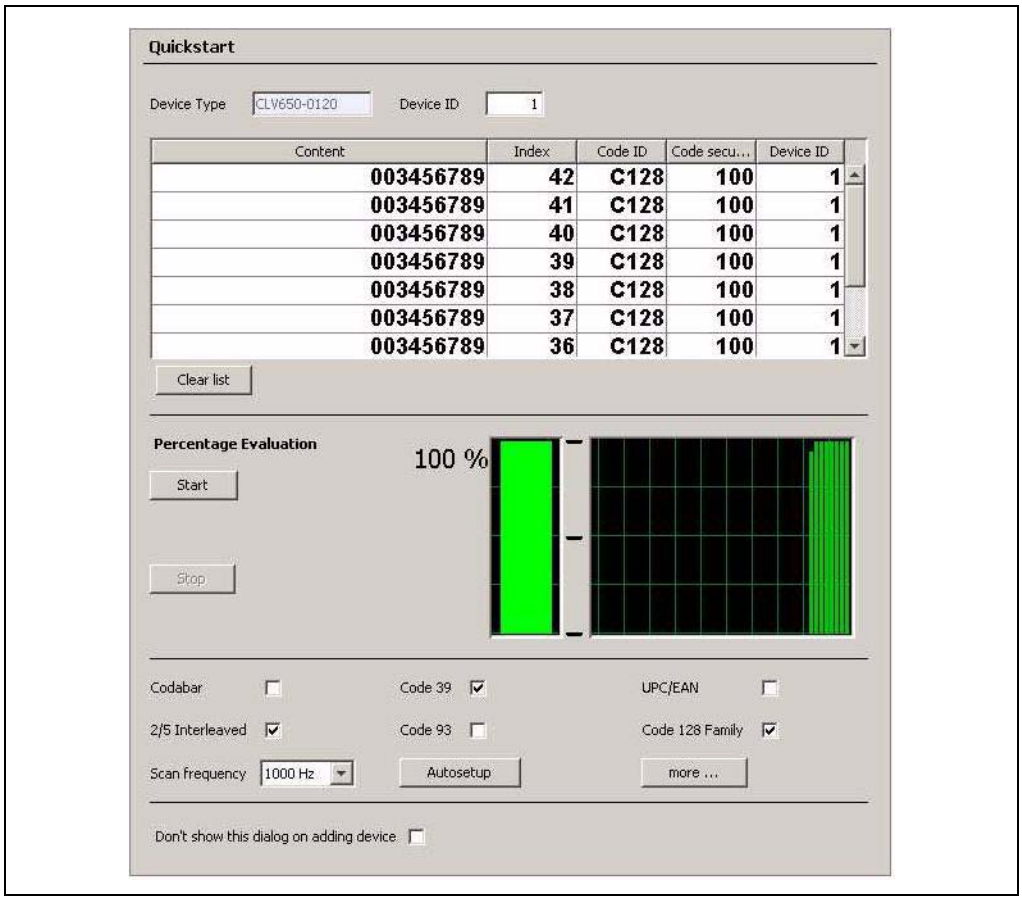

Fig. 3-1: Quickstart register tab of SOPAS-ET configuration software

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If the SOPAS-ET configuration software runs in **Single Device Mode**, a simplified register tab is shown:

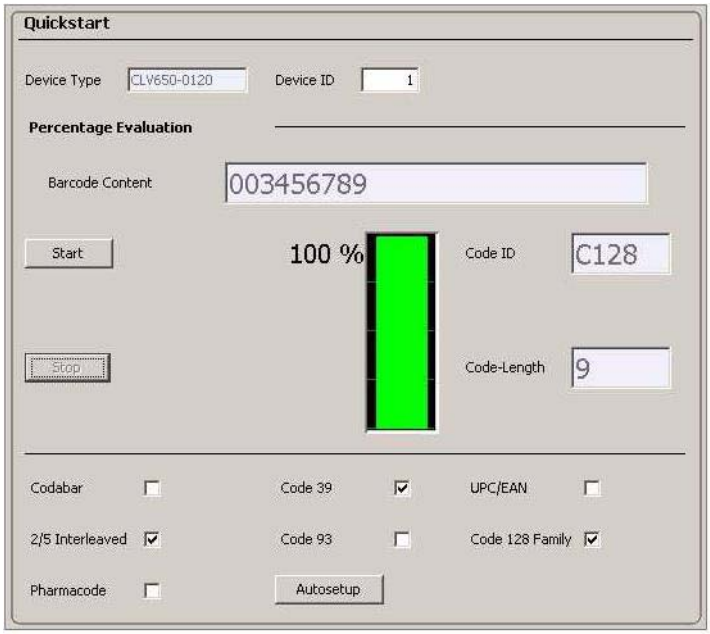

Fig. 3-2: Quickstart register tab in Single Device Mode

Performing the reading

Important The autofocus function is deactivated by default and the focus position is 500 mm (19.7 in). Automatic focus adjustment is described in *chapter 4.6.3 Autofocus function, page 31*.

1. Ensure that the relevant code types are activated on the register tab.
2. Carry out a test reading with a test bar code.

   To achieve this, hold an object with a bar code in front of the bar code scanner's reading window and trigger the reading by clicking START. If necessary, observe the bar code scanner's depth of fields ranges depending on resolution (see *chapter 10.4 Specification diagrams, page 84*).

   During reading operation and with default settings, the line scanner with oscillating mirror deflects the scanning line by the central position with a frequency of 1 Hz and at a max. angle of ± 20°.

   The reading result is displayed in the BARCODE CONTENT display field.

   The code reading reliability is specified in the relevant display field.

Optimise the reading conditions

If no reading result is displayed or if you wish to increase the code reading reliability, the reading can be repeated by taking the following measures:

- ➢ Install the bar code scanner in such a way that the bar code scanner's light meets the idle object (code) at a 15° angle (skew).
- ➢ Correct or optimise the parameter values where necessary via the SOPAS-ET configuration software.

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4 Product description

This chapter describes the design, the features and the functions of the CLV65x bar code scanner.

➢ For installation, electrical installation and startup assistance as well as for the application-specific configuration of the bar code scanner using the SOPAS-ET configuration software, please read this chapter **prior** to carrying out any of the tasks.

4.1 Setting up the bar code scanner

The CLV65x bar code scanner consists of a laser scanner (laser diode and lens) with autofocus (can be switched off) and an electronic unit with an integrated decoder. The laser scanner and electronic unit are located in a housing. The light exits and enters via a reading window in the industrial-type housing. The bar code scanner (depending on the version) is electrically connected by a cable with a connector or a revolving connector unit with two connections.

For an adaption to on-site space conditions/reading functions two housings are available: a housing with front reading window and a housing with oscillating mirror. Via the oscillating mirror, the laser beam exits through the side reading window at an angle of emergence of 105°. This corresponds to the central position (default settings) of the laser beam perpendicular to the scan direction.

4.1.1 Device view

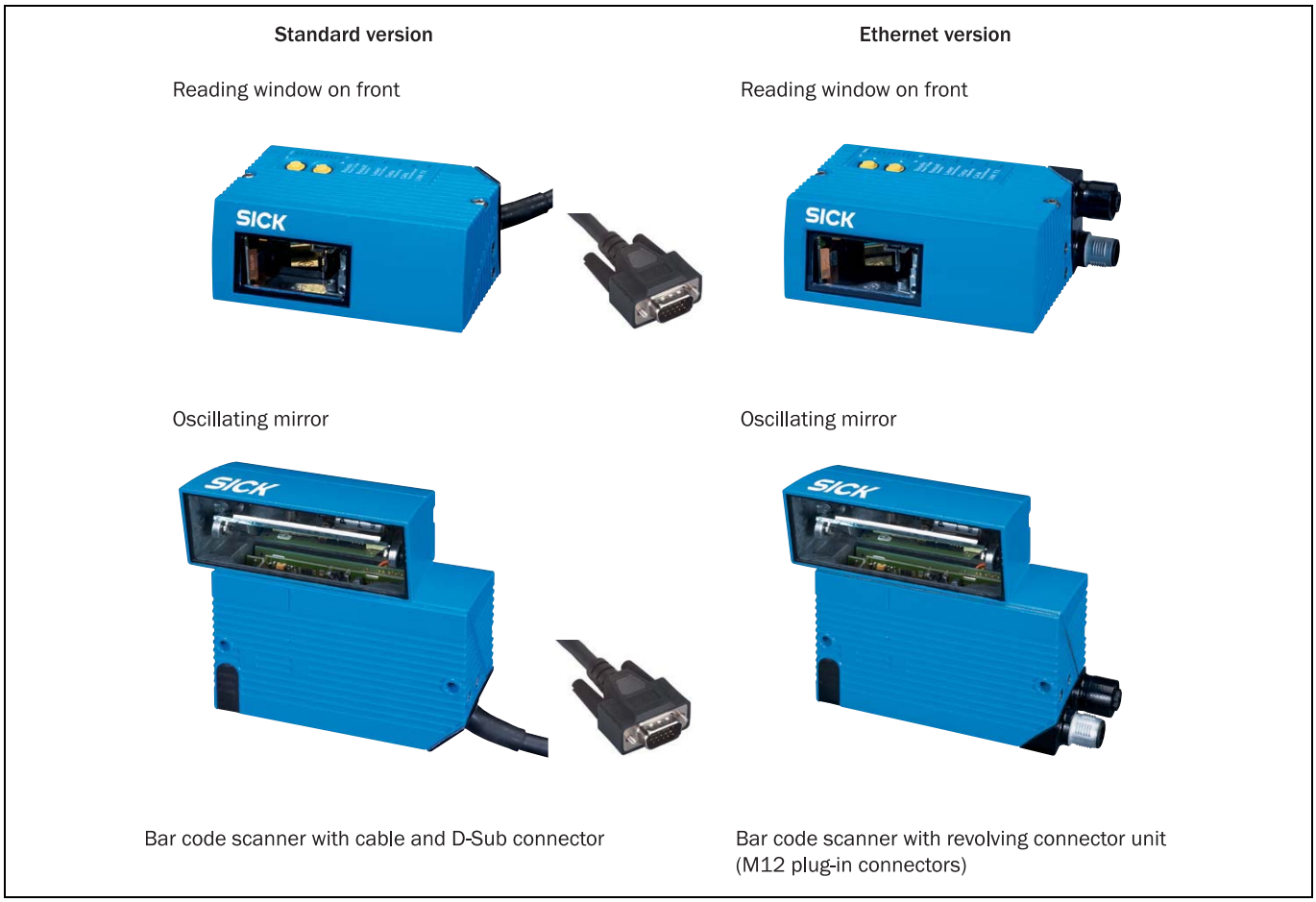

Fig. 4-1: Housing types of the CLV65x bar code scanner

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① Blind hole taps M5 (5 mm (0.2 in) deep) for fixing
② Laser warning sign
③ Cover of memory card slot
④ Type plate
⑤ Buttons for selecting/starting functions
⑥ LED Bargraph
⑦ LEDs for status indicator
⑧ Revolving connector unit
⑨ Reading window
⑩ 12-pole M12 plug
⑪ 4-pole M12 socket (Ethernet connection)
⑫ Micro SD memory card (optional)
Front reading window
Oscillating mirror

Fig. 4-2: Device view of the CLV65x bar code scanner (shown here: Ethernet-Version)

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4.2 Included in delivery

Delivery of the CLV65x bar code scanner includes the following components:

Piece (s)	Components	Comment
1	Bar code scanner	CLV650 / CLV651 depending on version
1	Set of laser warning signs for class 2 in German/American English and French/ American English	Self-adhesive to affix the warning sign to the bar code scanner's housing (if necessary)
1	Notes on device with electrical connection diagrams as primary information	Included in the device packaging of the CLV65x bar code scanner
1	CD-ROM "Manuals & Software Auto Ident"	
	CLV65x Operating Instructions in printed form, in German and/or Englisch	Optional, depending on the number of issues explicitly ordered upon purchase

Tab. 4-1: CLV65x bar code scanner delivery

Important The Micro-SD memory card is not included in delivery.

An overview of in-stock installation accessories, connection modules, cables and connectors, sensors for reading pulses, as well as memory media is available in the "CLV600 Bar Code Scanner" product information (see *chapter 11.5 Supplementary documentation, page 113*).

Important For save operation of the Micro-SD memory card, use only SICK approved memory card.

4.2.1 Contents of the CD-ROM

- **"SOPAS-ET":** Configuration software for Windows™ PCs with integrated online help system (HTML files)
- **CLV65x operating instructions:** PDF version in German and English as well as further publications of other SICK devices
- **CLV600 product information:** PDF version in German and English including ordering information for bar code scanner and accessories
- **"Acrobat Reader":** Freely available PC software for reading PDF files

Important The current versions of publications and programs on the CD-ROM can also be downloaded at **www.sick.com**.

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4.3 Device versions

The CLV65x bar code scanner with a glass reading window is available in the following versions, among others:

Order no.	Type	Scanning method	Reading window	Connection (design)
1041290	CLV650-0000	Line scanner	On front	Cable with connector
1042121	CLV650-0120	Line scanner	On front	Connector unit on device
1042124	CLV650-6000	Line scanner with oscillating mirror	On side	Cable with connector
1042125	CLV650-6120	Line scanner with oscillating mirror	On side	Connector unit on device
1046557	CLV651-0000	Line scanner	On front	Cable with connector
1046558	CLV651-0120	Line scanner	On front	Connector unit on device
1046559	CLV651-6000	Line scanner with oscillating mirror	On side	Cable with connector
1046560	CLV651-6120	Line scanner with oscillating mirror	On side	Connector unit on device

Tab. 4-2: Variants of the CLV65x Bar Code Scanner

Important Depending on the connection (design), the following interfaces are available:

- **Standard version (cable with connector)**
  - RS-232, RS-422/485, CAN, two digital switching inputs, two digital switching outputs, power supply
- **Ethernet version (revolving connector unit)**
  - Connector 1: Ethernet
  - Connector 2: RS-232, RS-422/485, CAN, one digital switching input, power supply

4.4 System requirements

General system requirements derive from the bar code scanner's technical data (see *chapter 10 Technical data, page 81*).

The requirements and conditions for *Installation*, *Electrical installation* and *Startup and configuration* are summarised in the respective chapters.

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4.5 Product features and functions (overview)

CLV65x bar code scanner	• Autofocus • Line scanner / line scanner with oscillating mirror • Reading window on front / side (oscillating mirror) • High scan frequency • Can be adapted to the print quality of the code • Evaluation area of the scanning line can be restricted
User safety and convencience	• Robust, compact metal housing, CE mark • Laser class 2, laser switches off in case of an error • Automatic self-test on system startup • Diagnosis tools for system setup and system (remote) monitoring • Configurable reading diagnosis data display in two reading result formats • Operational data retrieval, error code display on request in case of errors • Activatable test string function (heartbeat) for signalling readiness for operation • Password protected configuration mode • Configured parameter values (cloning) can be additionally secured on a Micro SD memory card (can be removed in the case of bar code scanner replacement) • Future proof due to firmware update (flash PROM) via data interface • Future-proof SOPAS-ET configuration software • Low current consumption • Extended power supply range
Convenient operation/configuration	• Configuration (online/offline) using the SOPAS-ET configuration software (incl. help system) • Auto-Setup of optical reading properties • Profile programming with bar codes, created and printed via SOPAS-ET • 2 buttons on the device for calling up preset functions without connecting a PC • Status indicators via five LEDs • Beeper that can be switched off to confirm device functioning
Reading operation modi	• Start/Stop operation
Reading pulse	• Pulse sources for start: switching inputs; data interface (command); automatic cycle; CAN • Pulse sources for stop: reading pulse source, switching inputs, command, timer, condition
Bar code evaluation	• All common bar code types • Max. number of bar codes: 50 per reading pulse • Separation of identical codes of the same code type using the reading angle
Data processing	• Manipulation of the output of the reading data via event-dependent evaluation conditions • Manipulation of the output strings through filter and output sort options
Data communication	• Host interface: two data output formats configurable, switchable to different physical interfaces, parallel operation possible • Aux interface: fixed data output format, switchable to different physical interfaces, parallel operation possible

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Electrical interfaces	• Host interface: RS-232, RS-422/485 (data format and protocol can be configured) and Ethernet or CAN • Aux interface: RS-232 (fixed data format, data transfer rate and protocol) and Ethernet • CAN interface for integration into the SICK-specific CAN-SENSOR network • Digital switching inputs – Standard version: Two digital switching inputs for external reading pulse sensor(s) or incremental encoder, using optocoupler – Ethernet version: One digital switching input on the device • Digital switching outputs – Standard version: Two digital switching outputs for signalling definable results in the reading process (reading result status) – Ethernet version: No digital switching output on the device
Connection technology (design)	• Standard version: Cable with 15-pole D-Sub-HD connector • Ethernet version: Revolving connector unit on the device with two M12 circular connectors • Connection module CDB620/CDM420 for connection to the host computer (standalone) and for integrating into the SICK-specific CAN-SENSOR network, as well as via CANopen • Bus connection module CMF400 in connection module CDM420 for connecting to field bus systems

Tab. 4-3: Overview of the bar code scanner's product features and functions

4.6 Bar code scanner's methods of operation

The CLV65x bar code scanner is an intelligent sensor system for automatic and non-contact detection and decoding of bar codes. In principle, the codes can be detected on any side of resting or moving objects in a conveyor system (**single-side reading**).

Several bar code scanners can be combined to allow detection of several sides in one passage (**multi-side reading**).

The bar code scanner creates a scanning line (**line scanner**) to recognise the codes.

Line scanner with oscillating mirror

The oscillating mirror additionally deflects the scanning line from the home position to both sides, perpendicular to the scanning direction, with a low oscillation frequency. This enables the bar code scanner to scan larger areas for bar codes as well.

The length of the scanning line that is used for the evaluation (reading area height) depends on the reading distance because of the V-shaped light exit.

The light pattern that is reflected by the bar code is recorded, processed and decoded. To control this process, external sensors deliver information via the reading pulse, the object distance and the conveyor speed (increment). The reading results are output to the bar code scanner's data interfaces and forwarded to a host/PC.

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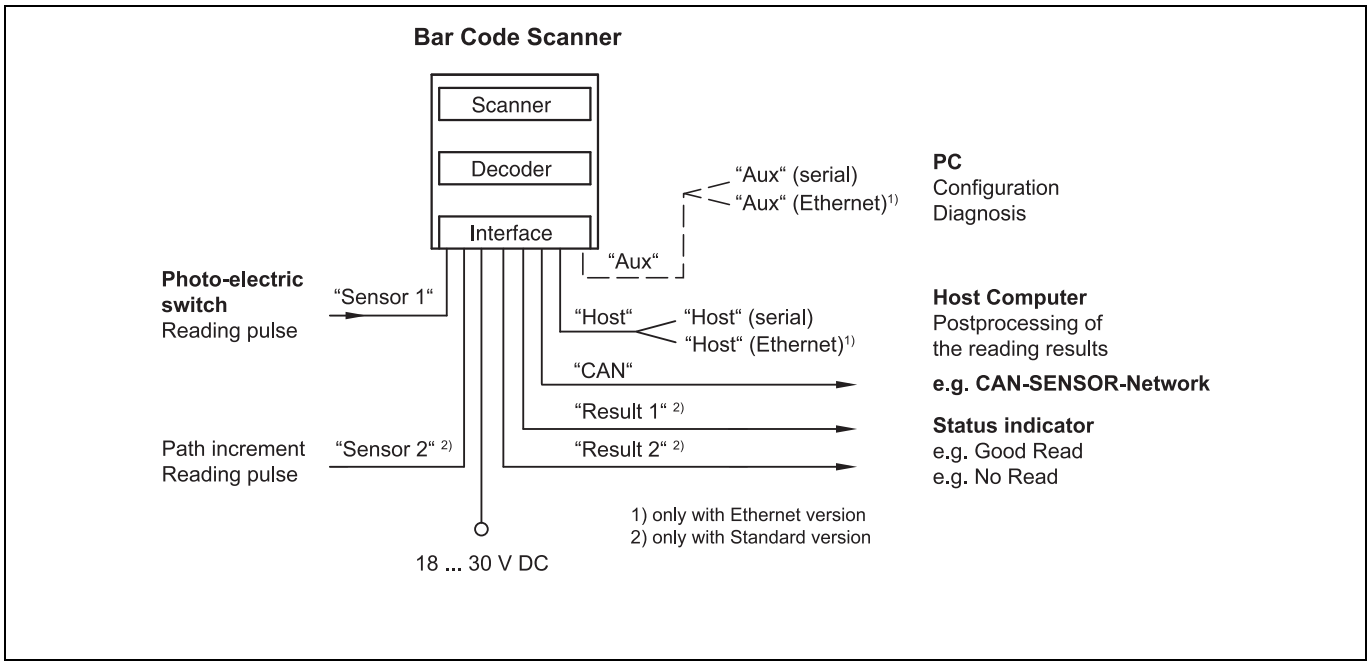

Fig. 4-3: Bar code scanner's methods of operation in a conveyor system (schematic)

The detailed wiring of the bar code scanner and the connections to the host/PC and to the external sensors are described in *chapter 6 Electrical installation, page 53*.

4.6.1 Reading configuration

The bar code scanner detects bar codes with an adjustable scan frequency.

The bar code scanner can detect codes on resting and moving objects.

For more rapid evaluation, the reading range of the scanning line (reading angle: RA value) can be restricted.

The SOPAS-ET configuration software can, among other things, be used to configure the reading angle and the symbol contrast:

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, CODELABEL PROPERTIES register tab.

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4.6.2 Object trigger control

In order to start an object-related reading process, the bar code scanner requires an appropriate external signal (trigger source) for reporting an object in the reading area. The start signal is emitted via an external reading pulse sensor (e. g. **photoelectric reflex switch**) as standard. As soon as an object has passed the reading pulse sensor, a time window opens in the bar code scanner (“reading gate“) for the reading process.

Alternatively, a command activates the reading process via a data interface or the CAN-SENSOR network. In Automatic Cycle mode, the actual bar code scanner generates the reading gate internally with an adjustable mark-space ratio.

The reading pulse can be ended in a number of ways: With external triggering by the reading pulse source or a command, internally by a timer or an evaluation condition to be met.

The trigger source can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, OBJECT TRIGGER CONTROL, START/STOP OF OBJECT TRIGGER register tab

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4.6.3 Autofocus function

The autofocus function enables the CLV65x to detect the distance of an object without the need for external sensors and adjusts the focus position automatically. In order to do so, the CLV65x measures the object distance in its reading field in front of the reading window and internally creates a distance profile.

The autofocus function operates in "Differential background" mode. The distance profile of the reading field background is programmed (teach-in) in the CLV65x without any objects present. The CLV65x focuses on the object which it recognizes by comparing the object with the background. Application: with unobstructed view of the object restricted by other objects that protrude constantly into the reading plane. Only one object with barcode(s) is inside the reading field during one reading pulse.

The distance profile of the background can also be displayed in the SOPAS-ET configuration software. The autofocus range is defined by the aperture angle, the autofocus space, and (in the case of line scanners with oscillating mirror) also by the angle of deflection. The park setting of the focus position, from which the device focuses for each read, can be specified to the CLV65x in addition to a time and/or position-related delay (timeout or hysteresis). If necessary, an offset can be defined for the focus position to be set by the measurement. The depth of field, which radiates in the direction of the scan lines caused by the V-principle of the beam deflection, is optimized as a result.

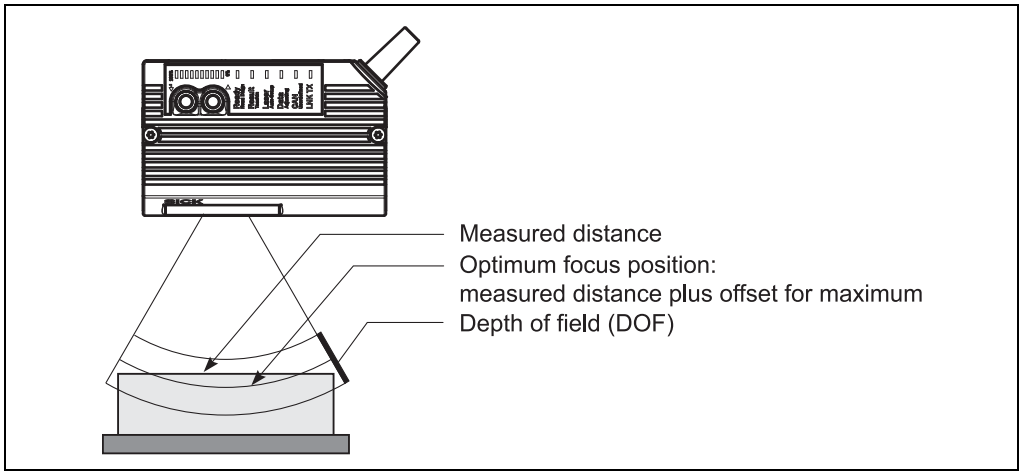

Fig. 4-4: Optimization of the depth of field for the object

The autofocus function can be configured using the SOPAS-ET configuration software: PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, FOCUS CONTROL, OPTIONS register tab, AUTOFOCUS parameter

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4.6.4 Switchable focus position

As an alternative to the autofocus function, the focus position of the CLV65x can be changed dynamically thus covering a wide reading area.

You can define up to 8 reading areas for the distance configuration which can be started in any order by the lens in reading operation.

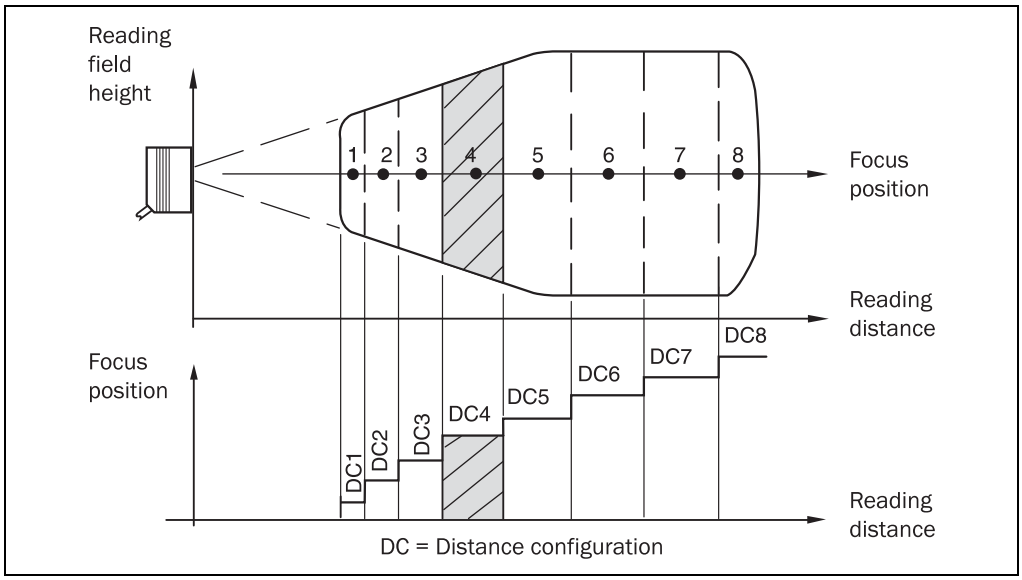

Fig. 4-5: Switching the focus for CLV65x: Division of the entire reading area in distance configurations

The focus is shifted by changing the object position (e. g. when reading downwards: detection of object height).

Trigger sources for the switch-over are:

- Signal at the switching input "Sensor 2" for max. 2-pole switching
- Command from the host interface or the integrated timer (e.g. search run) for the max. 8-pole switch-over
- Reversal points of oscillation mirror for the bilateral deflection on the line scanner with oscillating mirror (see *chapter 4.6.5 Oscillating mirror control, page 33*)

The distance configurations of the switching order are assigned via the programmable cross-reference list.

The focus position can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, OSCILLATING MIRROR

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, FOCUS CONTROL

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, DYNAMIC READING CONFIGURATION

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4.6.5 Oscillating mirror control

You can manipulate the position of the scanning line for the line scanner with oscillating mirror (CLV65x-6000/CLV65x-6120) by configuring the oscillating mirror.

In addition to **parking** (fixed scanning line position which can be adjusted) or **continuous oscillation** independent of the reading pulse, **controlled operation** of the oscillating mirror also enables optimised operation sequences related to the reading pulse:

- n-fold oscillation around an adjustable start position within the reading pulse
- one-shot: one-time deflection (forward and return) per reading pulse from an adjustable start position

In every oscillation mode, the amplitude can be adjusted separately for each of the two deflection directions. The deflection speed ratio of one deflection direction to the other can be adjusted within the selected periodic time for the entire oscillation sequence.

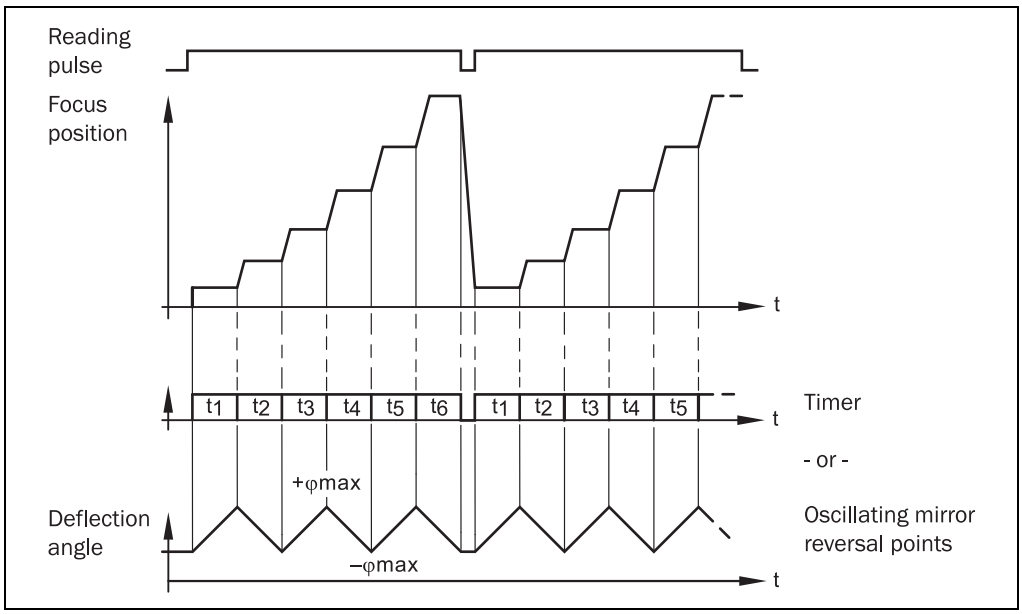

Fig. 4-6: Oscillating mirror CLV65x: Example of focal position control in search run, here with 6 focus positions

The behaviour or the position of the oscillating mirror can be configured via the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, READING CONFIGURATION, OSCILLATING MIRROR, OSCILLATING MIRROR register tab

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4.6.6 Increment configuration

The bar code scanner receives information about the conveyor speed from an external incremental encoder, for example. The incremental encoder delivers pulses which are used to determine the current conveyor speed.

The conveyor speed results from the number of impulses and the resolution of the external incremental encoder.

The increment source and the resolution/speed can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, INCREMENT CONFIGURATION, INCREMENT register tab

4.6.7 Code configuration

The bar code scanner can decode the following code types:

- Codabar
- Code 39
- UPC/EAN
- 2/5 Interleaved
- Code 93
- Code -128 family
- Pharmacode

The code types can be selected and configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, CODE CONFIGURATION, CODE TYPES register tab

The selected code types can be configured individually. For this purpose, separate register tabs are available in the configuration software SOPAS-ET.

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4.6.8 Reading operation mode

There is only one **object** in the reading field during **start/stop operation**, i.e. all the read codes should be unambiguously assigned to the object. Starting and stopping the reading process controls one/two reading pulse sensors at the beginning and at the end of the reading field by default. The distance between each sensor is determined by the size of the reading field. The reading process can be alternatively controlled with command strings via the data interface. The output of the reading results is carried out either at the end of the reading pulse (the rear edge of the object has left the end of the reading field) or during the reading pulse if certain configurable conditions have been fulfilled.

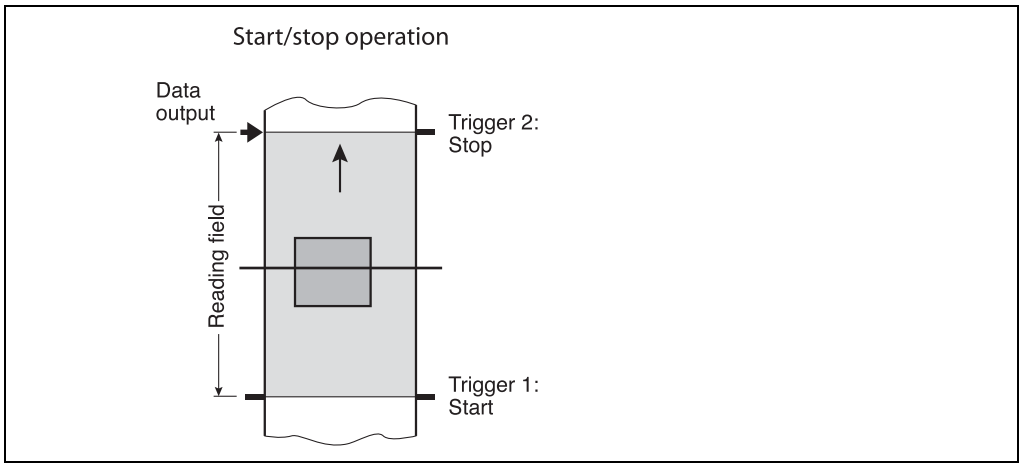

Fig. 4-7: Reading operation mode for the CLV65x bar code scanner in stand-alone operation

The reading operation mode can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, DATA PROCESSING, TRACKING register tab

4.6.9 Data processing

The output time in the reading process with regard to the reading pulse start can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, DATA PROCESSING, OUTPUT CONTROL

Furthermore, the evaluation conditions, filters and sorters for data output to the host computer can be configured:

PROJECT TREE, CLV65X, PARAMETER, DATA PROCESSING, EVALUATION CONDITION

PROJECT TREE, CLV65X, PARAMETER, DATA PROCESSING, FILTER/SORTER FOR OUTPUT

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4.6.10 Output format

The reading result (decoded codes) is displayed via selectable physical interfaces. Two different output formats (telegrams) can be defined for this task, one format for "No Read" and one for the heartbeat (signalisation of readiness).

The output formats can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, DATA PROCESSING, OUTPUT FORMAT

4.6.11 Network / interface / IOs

All important interfaces for displaying the reading results are available on the bar code scanner. Several bar code scanners can be connected to each other via the CAN bus in the SICK-specific CAN-SENSOR network or via CANopen.

The network parameters can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, NETWORK / INTERFACE / IOS, NETWORK OPTIONS register tabs

4.6.12 Data interfaces

The following data interfaces are available on the bar code scanner depending on the version:

Data interface	Function
Host interface (RS-232 or RS-422/485 and Ethernet host port)	Preparation of the reading result for further processing by the host processor
Auxiliary interface (RS-232 and Ethernet aux port)	Reading diagnosis or host interface monitoring
CAN	Connection of several bar code scanners to the SICK-specific CAN-SENSOR network, as well as via CANopen

Tab. 4-4: Data interface function

The data interfaces can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, NETWORK / INTERFACE / IOS, SERIAL

PROJECT TREE, CLV65X, PARAMETER, NETWORK / INTERFACE / IOS, ETHERNET

PROJECT TREE, CLV65X, PARAMETER, NETWORK / INTERFACE / IOS, CAN

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4.6.13 Digital inputs

The external sensor for the object triggering (photoelectric reflex switch) and the incremental encoder, e.g., can be connected to the digital switching inputs.

The digital inputs can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, NETWORK / INTERFACE / IOS, DIGITAL INPUTS

Important The connection "Sensor 2" is only available in the standard version of the bar code scanner. For the Ethernet version of the bar code scanner, this input is only available with the connection module CDB620/CDM420 in combination with the parameter memory module CMC600.

4.6.14 Digital outputs

With certain events in the reading process (e.g. for unsuccessful decoding "No Read"), two independent switch signals can be generated at both digital outputs and can be used, e.g., to display the event status.

The digital outputs can be configured using the SOPAS-ET configuration software:

PROJECT TREE, CLV65X, PARAMETER, NETWORK / INTERFACE / IOS, DIGITAL OUTPUTS

Important The switching outputs "Result 1" and "Result 2" are only available in the standard version of the bar code scanner. For the Ethernet version of the bar code scanner, the two outputs are only available with the connection module CDB620/CDM420 in combination with the parameter memory module CMC600.

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4.7 Control elements and indicators

4.7.1 User interface

The bar code scanner is configured application-specifically using the SOPAS-ET configuration software (see *chapter 7.4.1 Overview of the startup procedure, page 70*). Its software runs on a PC which must be connected to one of the two data interfaces (aux interface: Ethernet or RS-232, host interface: RS-232/RS-422/485 or Ethernet) of the bar code scanner.

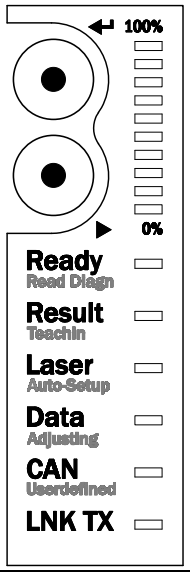
As an alternative to the SOPAS-ET configuration software, command strings are available upon which the user interface of the SOPAS-ET configuration software is based (see *chapter 11.2 Configuring the bar code scanner with command strings, page 107*).

In case of an error, startup and diagnosis can be carried out via the SOPAS-ET configuration software. The bar code scanner operates fully automated in normal operation.

4.7.2 LEDs on the bar code scanner's housing

The bar code scanner's housing has six LEDs displaying the operating status, the laser diode's activity, the status of the reading result and the transfer to the RS-232/RS-422/485, CAN and Ethernet interfaces.

In reading operation the LEDs indicate the following:

	LED	Colour	Denotation
	READY	green	• Lights up constantly after switching on and having performed a successful self-test • Goes out when parameter values are being uploaded from or downloaded to the bar code scanner
		red	• Lights up when a hardware error has been detected
	RESULT	green	• Lights up after a successful read (Good Read, 100 ms)
	LASER	green	• Reading operation: Lights up when the laser diode is switched on (depends on the reading pulse)
	DATA	green	• Lights up during the data transfer for 100 ms
	CAN	yellow	• Flickers during the data transfer via the CAN interface
	LNK TX	green	• Lights up when the physical Ethernet connection is o.k.
	Bar graph (0 ... 100%)	green	• LEDs light up according to the reading rate during diagnostic mode. • During normal reading mode the bar graph display is switched off.

Tab. 4-5: LED indications

Important The “Result“ LED is not coupled with one of the “Result 1“ or "Result 2" outputs.

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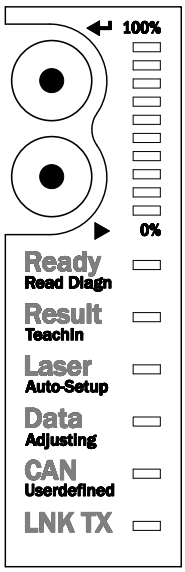
4.7.3 Buttons on the bar code scanner housing

There are two yellow buttons on the bar code scanner housing in the LED area (see *chapter 4.1.1 Device view, page 23*). You can call up predefined functions via these buttons.

After changing to the button operating mode you can select one function each by repeatedly pressing the lower button (▶). By pressing the upper button (↵), you can start or stop the selected function. The "TeachIn" function (for matchcode) and "Auto-Setup" stop the bar code scanner automatically. Currently you cannot call up user-defined functions.

The selected function is shown via the corresponding LED below the buttons.

When using both of the buttons the LEDs have different meanings than in normal reading operation:

	LED	Colour	Function
	Read Diagn	green	Flashes slowly: the "Reading diagnosis/evaluation" function is selected Flashes rapidly: the "Reading diagnosis/evaluation" function is started
	TeachIn	green	Flashes slowly: the "TeachIn matchcode" function is selected Flashes rapidly: the "TeachIN matchcode" function is started
	Auto-Setup	green	Flashes slowly: the "Auto-Setup" function is selected Flashes rapidly: the "Auto-Setup" function is started
	Adjusting	green	Flashes slowly: the "Adjusting" function is selected Flashes rapidly: the "Adjusting" function is started
	Userdefined	yellow	(temporarily not available)

Tab. 4-6: Meaning of the LEDs during activation of buttons

Important When using the buttons, the "Laser" LED's function differs from its original function in reading operation, the display of the switched-on laser diode.

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Use of the buttons

In order to use one of the possible function with the buttons, do as follows:

1. Press the upper button (↵) for approx. 3 seconds.

   The bar code scanner stops the current reading operation, switches off the LEDs and the bargraph display and changes to the button operating mode. With immediate effect the bar code scanner ignores all the other external reading pulses. No reading results are displayed via the host interface.

   The beeper confirms this process with an ascending melody.

   The "Read Diagn" function is pre-selected as first function (LED flashes slowly).
2. Repeatedly press the lower button (▶) until the LED of the required function flashes. The bar code scanner scans all the possible functions successively without starting them and starts over.

   The beeper confirms each step with a sound.
3. Press the upper button (↵) once to start the selected function.

   The LED flashes faster and the beeper confirms the start with two sounds.
4. Press the upper button (↵) again to stop the function.

   The LED flashes more slowly again and the beeper confirms the end with two sounds.

   The bar code scanner stops the "TeachIn" (for matchcode) and "Auto-Setup" function automatically, when the presented bar code was read successfully. During this procedure, the "Ready" LED flashes in green three times and the beeper confirms it with an ascending melody.
5. In order to return from the button operating mode to the reading operation, press the upper button (↵) again for approx. 3 seconds.

   The beeper confirms the change with a descending melody.

   The "Ready" LED lights up again.

   The bar code scanner is ready for reading and waits for a reading pulse.

Important When using the Auto-Setup function, make sure that the bar code is in the maximum readable distance to the bar code scanner.

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Further behaviour of the bar code scanner when operated via the buttons:

- Changing into button operating mode is only possible if no other user is logged onto the bar code scanner for changing the parameters via the SOPAS-ET configuration software. If this is the case, however, a descending melody is started by the beeper when trying to change into the button operating mode. The bar code scanner remains in reading operation.
- In case a user logs onto the bar code scanner in button operating mode, the bar code scanner leaves the button operating mode and restarts the reading operation. The beeper confirms the change with a descending melody.
- If no function is started in button operating mode or if no button operation can be performed after using a function, the bar code scanner returns into reading operation automatically after 30 seconds. The beeper confirms the change with a descending melody.
- The bar code scanner terminates an activated continous function 5 minutes after start. It returns to reading operation automatically. The beeper confirms the change with a descending melody.
- If the bar code scanner could not read the bar code in the "TeachIN" (for matchcode) as well as "Auto-Setup" functions, the "Ready" LED flashes in red for three times. The beeper reports this with a descending melody. After that the bar code scanner remains in button operating mode.
- You cannot switch off or turn down the beeper in button operating mode.

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4.7.4 Parameter set on the Micro SD memory card (optional)

The bar code scanner stores configured parameter values in the internal PROM as well as on the Micro SD memory card (cloning), provided that this card has been inserted into the bar code scanner. If the bar code scanner needs to be replaced, the memory card enables easy and quick transfer of the parameter set to the new device (see *chapter 8.5 Replacing a bar code scanner, page 78*).

Important In order to avoid data loss, the Micro SD memory card may only be removed and inserted into the new device after the respective bar code scanner has been switched off and de-energized. When inserting the memory card, make sure that the contacts point backwards and upwards (towards the inscription "mircoSD" on the box slot).

The memory card is located behind a black rubber cover attached to the bar code scanner.

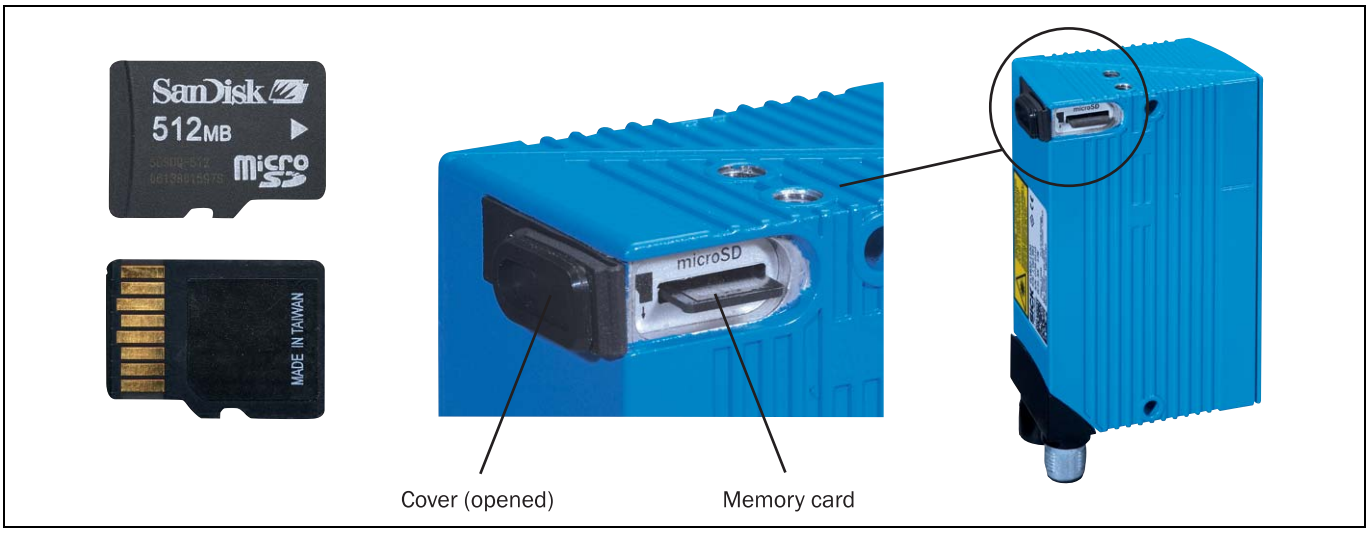

Fig. 4-8: Micro SD memory card for storing the parameter set

Important To maintain the enclosure rating IP 65, the black rubber cover has to be closed and lie flush against the device.

As an alternative to the Micro SD memory card in the bar code scanner, the external, optional parameter memory module CMC600 in connection module CDB620/CDM420 may also be used for storing the parameter set. If both the Micro SD memory card and the parameter memory module CMC600 are available, the bar code scanner will load the parameter set from the CMC600.

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5 Installation

5.1 Overview of installation sequences

This chapter describes the installation sequences for the bar code scanner and its external components.

The typical installation sequences are displayed below:

- Changing the language of the laser warning sign (if necessary)
- Selecting the installation location for the bar code scanner
- Aligning the bar code scanner to the object carrying the bar code
- Installing the bar code scanner
- Installing connection module CDB620 or CDM420
- Connecting the bar code scanner to connection module CDB620 or CDM420
- Adjusting the bar code scanner
- Installing the reading pulse sensor for reading pulse triggering

Important **Do not open the bar code scanner's housing. If the device is opened, the SICK AG warranty shall not apply.**

5.2 Installation preparations

Observe the following general requirements for installation:

- Typical space requirement: application specific
- Unobstructed view of the objects for the bar code scanner
- Stable installation bracket with sufficient load capacity and measurements suited to the bar code scanner (see *chapter 10.5 CLV65x bar code scanner diminsional drawings, page 103*)
- Shock absorbant and vibration free attachment

The following tools and resources are required for installation:

- Two M5 bolts:

  To fix bracket no. 2020410, quick release clamp no. 2025526 or fix bracket no. 2042800 to the base.

  The bolt length depends on the wall thickness of the base.
- Laser warning sign set (if necessary)
- Tool
- Tape measure (up to 1 m (3.28 ft))
- Goniometer

5.2.1 Components to be installed

The following components have to be placed ready for installation:

- CLV65x bar code scanner

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5.2.2 Accessories

The following accessories are not included in the delivery of the bar code scanner. They have to be ordered separately and placed ready for installation, if necessary:

- Mounting device, see next chapter
- External mirror hood
- Connection module CDB620 or CDM420
- Reading pulse sensor for external reading pulse triggering, e. g. photoelectric reflex switch/photoelectric proximity switch

5.2.3 Mounting device

The bar code scanner is fixed using two blind hole taps (M5) that are each located on the narrow sides of the device (see *chapter 10.5 CLV65x bar code scanner diminsional drawings, page 103*).

The bar code scanner can be mounted using the following SICK holders:

- Bracket no. 2020410
- Quick release clamp no. 2025526
- Bracket no. 2042800
- Round rod holder no. 2042801

The construction of the angle with adapter plate no. 2042800 supports e. g. varied mounting options and the alignment of the bar code scanner in two axis.

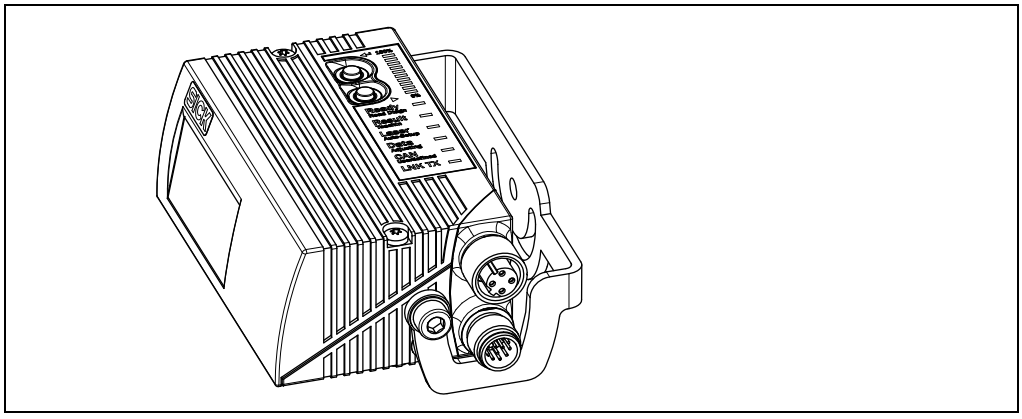

Fig. 5-1: Example: Fixing the bar code scanner with the bracket no. 2042800

The dimensioning of the SICK-holders is shown in *chapter 11.4 Dimensional drawing accessories, page 109*.

Alternatively, the user can provide a holder.

The holder should meet the following requirements:

- Stable mounting device
  - Adjustable alignment of the bar code scanner in the x and y axis
  - The mounting device must be able to bear the weight of the bar code scanner including its connection cable (depending on the device version) without vibrating.
- Two M5 bolts to fix the bar code scanner
  - Screw length depends on the thickness of the mounting device
  - Maximum thread reach in the bar code scanner is 5 mm (0.2 in) from the housing surface

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5.2.4 Exchanging the laser warning sign

The laser warning on the bar code scanner must be in a language that is understood by the operators of the unit in which the bar code scanner is integrated.

A set of self-adhesive laser warning signs German/American English and French/American English is included in the delivery.

➢ If necessary, replace the English laser warning sign before operating the bar code scanner.

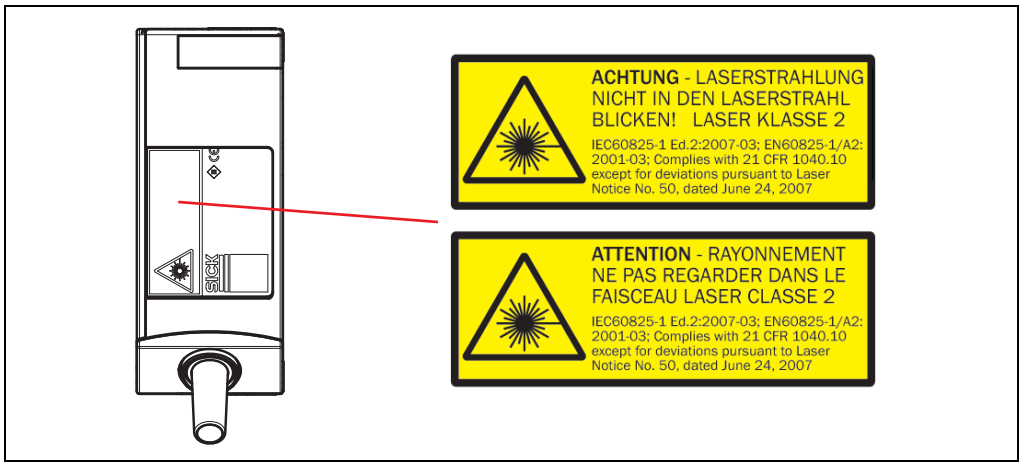
ACHTUNG - LASERSTRAHLUNG
NICHT IN DEN LASERSTRAHL
BLICKEN! LASER KLASSE 2
IEC60825-1 Ed.2:2007-03; EN60825-1/A2:
2001-03; Complies with 21 CFR 1040.10
except for deviations pursuant to Laser
Notice No. 50, dated June 24, 2007
ATTENTION - RAYONNEMENT
NE PAS REGARDER DANS LE
FAISCEAU LASER CLASSE 2
IEC60825-1 Ed.2:2007-03; EN60825-1/A2:
2001-03; Complies with 21 CFR 1040.10
except for deviations pursuant to Laser
Notice No. 50, dated June 24, 2007
SICK

Fig. 5-2: Exchanging the laser warning sign

5.3 Installation location

The following aspects are relevant for the selection of the installation location:

- Allocation of the scanning line for the bar code
- Reading distance to the bar code and aperture angle α
- Angle alignment of the bar code scanner
- Avoiding surface reflections
- Counting direction of the reading angle (position of the bar code along the scanning line)

Furthermore, the distance between the bar code scanner and the host computer and the distance to the connection module has to be taken into account (see *chapter 6.2 Electrical installation preparations, page 53* and *chapter 5.5.1 Installing connection module CDB620 or CDM420, page 51*).

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5.3.1 Allocation of the scanning line for the bar code

The main allocation of the scanning line to the bar code on the object depends on the version of the bar code scanner (**line scanner** or **line scanner with oscillating mirror**).

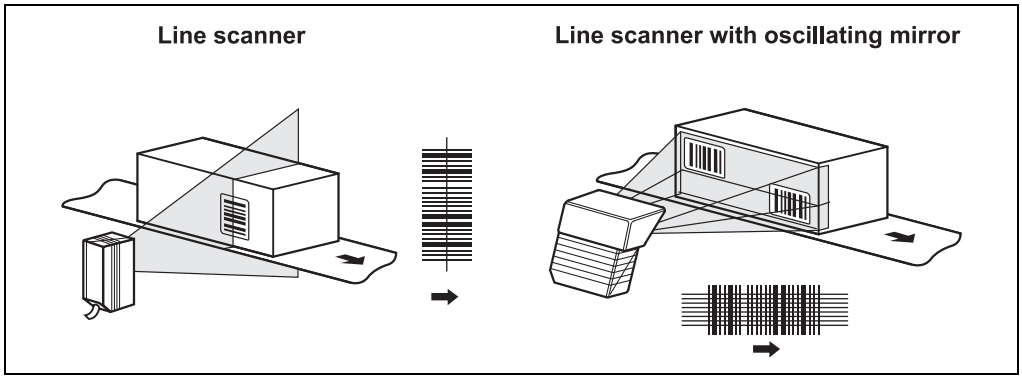

Fig. 5-3: Allocation of the scanning line(s) for the bar code and conveyor system

5.3.2 Reading distance to the bar code and aperture angle α

The maximum distance between the bar code scanner's reading window and the bar code must not exceed the device-specific thresholds.

The usable length of the scanning line that is used for the evaluation (reading area height) depends on the reading distance because of the V-shaped deflection of the beam.

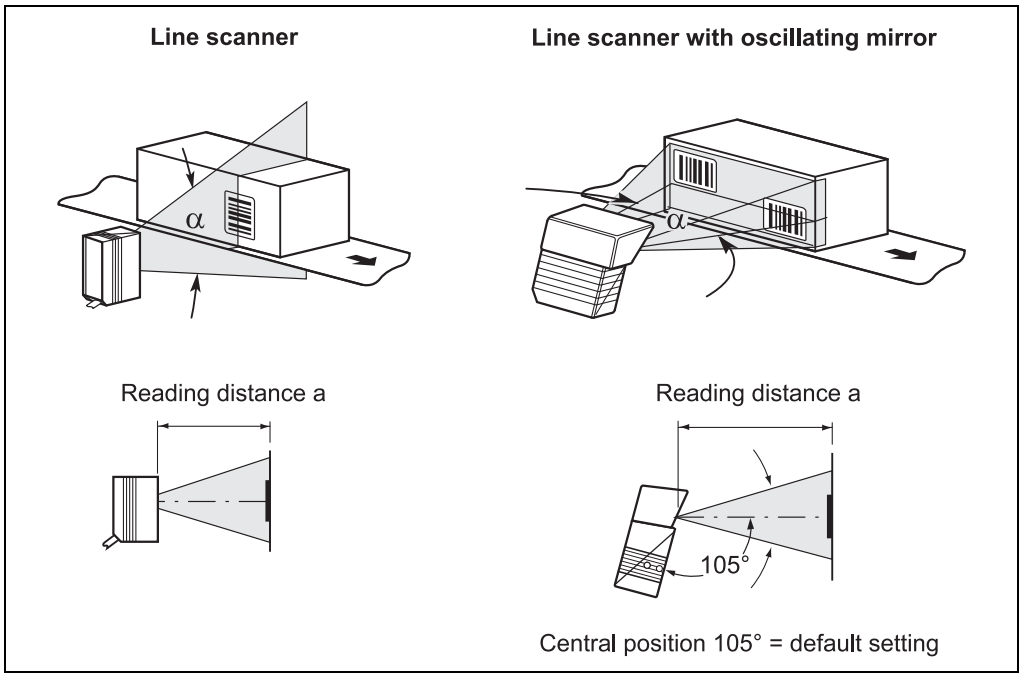

Fig. 5-4: Definition of the reading distance a and the aperture angle α

In the specification diagrams (see *chapter 10.4 Specification diagrams, page 84*) the depth of field is shown depending on the adjustable focus position and the aperture angles used for various resolutions (modul widths).

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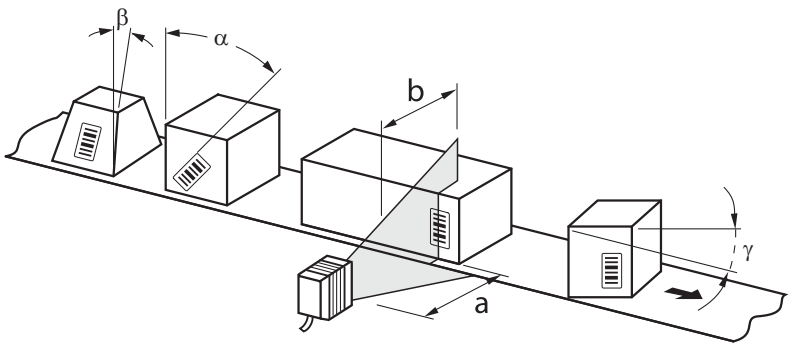
5.3.3 Angle alignment of the bar code scanner

The bar code scanner is optimally aligned if the scanning line almost scans the lines of the bar code in the right-hand angle (90°). Take into account the possible code positions that can occur between the scanning line and bar code in all three levels of the room.



α Azimut angle (tilt)
β Inclination angle (pitch)
γ Step angle (skew)
a Reading distance
b Reading range

Fig. 5-5: Line scanner: Reading angles that occur between the scanning line and bar code

Angle	Threshold
Azimut α (tilt)	max. 30° (resolution 0.35 mm (13.8 mil), depending on the print image)
Inclination β (pitch)	max. 45° (depending on module width)
Step angle γ (skew)	max. 45° (depending on module width)

Tab. 5-1: Permitted reading angles between the scanning line and bar code

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5.3.4 Avoiding surface reflections

If the light of the scanning line(s) vertically meets the surface of the bar code, this can result in disruptive reflections when the bounced back light is received. To prevent this effect, the bar code scanner must be installed in such a way that the light emitted is tilted down relative to the plumb line.

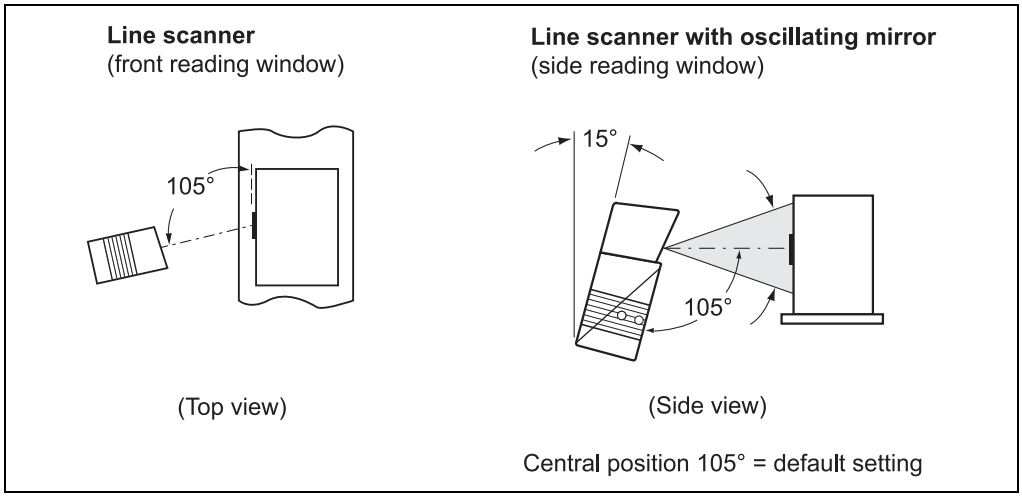

Fig. 5-6: Avoiding surface reflection using the line scanner as an example: Angle between emitting light and bar code (tilted away from the plumb line)

5.3.5 Counting direction of the reading angle and code angle

The bar code scanner can scan and decode several bar codes with every reading process.

The location-related reading diagnosis data is determined:

- The reading angle from the reading window to the red scanning line of the deflected scanning beam under which the middle of a bar code is detected can be displayed as an RA (reading angle) value.
- In addition, the line scanner with oscillating mirror can display the deflection angle of the scanning line under which the bar code scanner detects the bar code on the red scanning line as CW (code angle) value.

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The determination of the RA/CW value enables identical bar codes (code type, code length and data contents) to be separated and the bar code data to be assigned to their position on the object.

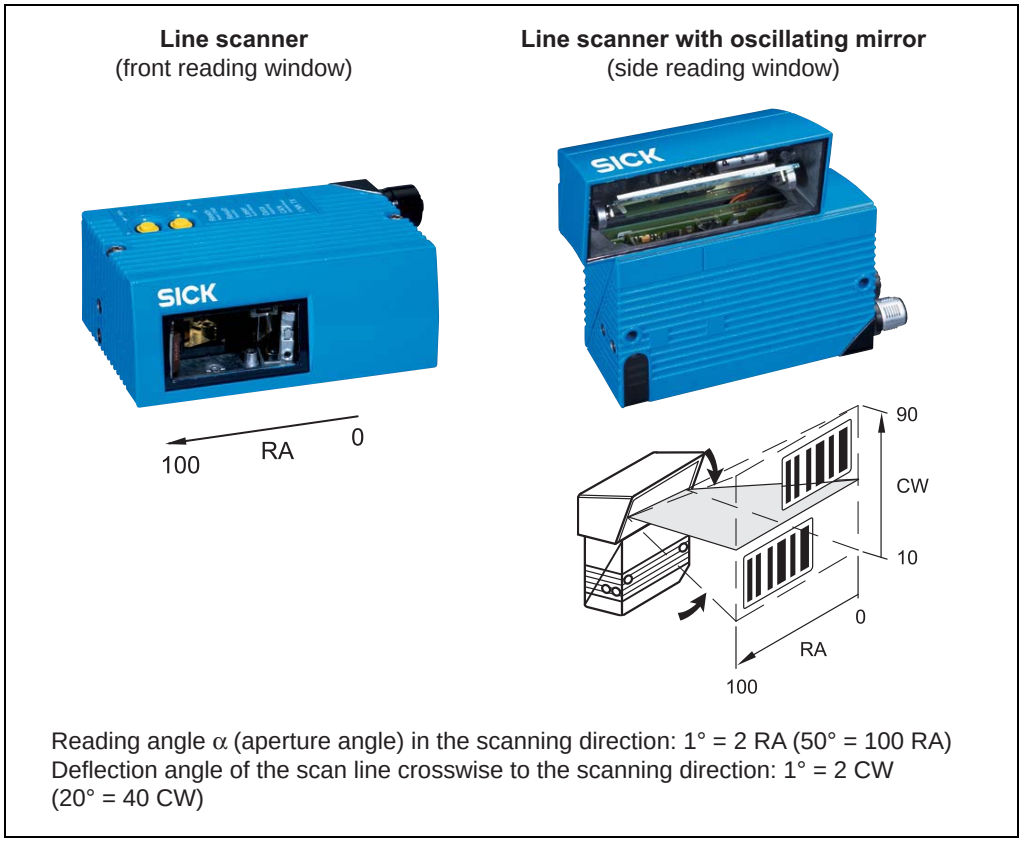

Fig. 5-7: Counting direction of the reading angle RA within the scanning line and of the code angle CW with oscillating mirror

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5.4 Installation of the bar code scanner

5.4.1 Installing the bar code scanner

NOTICE

Damage to the device!

The maximum thread reach of the two blind hole taps M5 is 5 mm (0.2 in). Longer bolts will damage the device.

➢ Use bolts of a suitable length.

1. Prepare the base for the installation of the bar code scanner holder (see *chapter 5.2.2 Accessories, page 44*).
2. Place the object with the bar code at the designated position where the reading should be taken in the bar code scanner's visual range (no conveyor movement).
3. Visually align the bar code scanner to the bar code. Observe the following:
   - When using the bar code scanner with front reading window, ensure that the narrow reverse side of the device with the laser warning sign is facing the viewer and is approximately parallel to the bar code surface.
   - When using the bar code scanner with side reading window, respectively the line scanner with oscillating mirror, ensure that the wide side panel with the LEDs is facing the viewer and is approximately parallel with the bar code surface.
   - During the reading process, consider the reading angle (see *chapter 5.3.3 Angle alignment of the bar code scanner, page 47*).
   - If the bar code's position within the scanning line is relevant for the evaluation, observe the reading angle's counting direction (see *chapter 5.3.5 Counting direction of the reading angle and code angle, page 48*).
4. Installing the bar code scanner holder on the base.
5. Screw M5 bolts through the holder and into the bar code scanner's blind hole taps and gently tighten them.
6. Adjust the bar code scanner (see *chapter 7.6.1 Adjusting the bar code scanner, page 73*).

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5.5 Installation of external components

5.5.1 Installing connection module CDB620 or CDM420

Depending on the application, you can install either connection module CDB620 or CDM420. The installation process is the same for both modules.

Important If the PC with the SOPAS-ET configuration software accesses the bar code scanner's auxiliary interface (RS-232; 57.6 kbd) via the connection module, the connection module should not be installed more than 3 m (9.84 ft) cable lengths away from the bar code scanner.

1. Install the connection module close to the bar code scanner.
2. Install the connection module in such a way that the opened device can be accessed at any time.

For detailed information about installation and electrical installation, see the operating instructions "Connection Module CDB620“ (no. 8012119, German/English) or "Connection Module CDM420-0001“ (no. 8010004, German/English).

5.5.2 Installing the external reading pulse sensor

If the bar code scanner is triggered by an external reading pulse sensor (photoelectric reflex switch), the sensor has to be installed close to the bar code scanner.

The SICK catalog "SENSICK Sensoren for Automation" (order no. 8006530, English) contains a large selection of photoelectric reflex switches and photoelectric proximity switches as well as accessories (holders, connection cables).

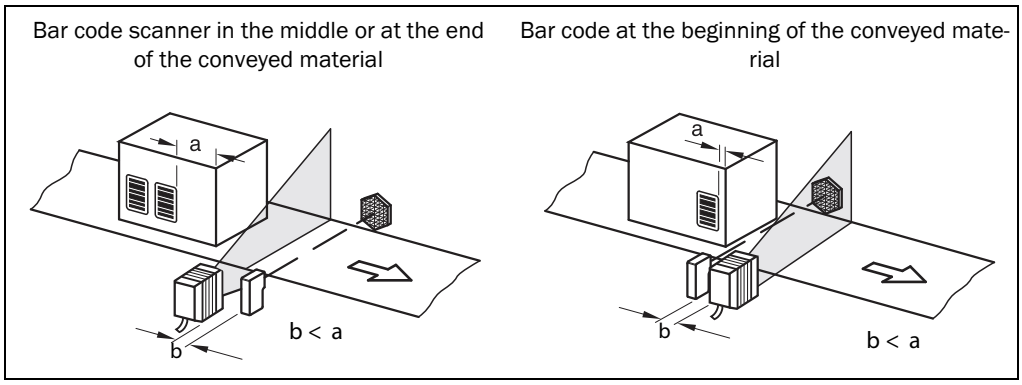
Bar code scanner in the middle or at the end of the conveyed material
Bar code at the beginning of the conveyed material
a
b
b < a
a
b
b < a

Fig. 5-8: Line scanner: Installation example for positioning the external reading pulse sensor

The sensor's installation location depends on the distance (a) of the bar code to the front edge of the object. Depending on the application, the sensor should be attached in such a way that bar codes on different sized objects can be fully read during the evaluation (reading gate).

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5.5.3 Installing the incremental encoder

An incremental encoder is required for separating bar codes with the same code type and identical content.

The increment impulses have to come from the conveyor system area where the bar code scanner is reading.

1. Install suitable increment encoders near to the bar code scanner, best against the direction of the conveyor system in front of the bar code scanner.
2. Ensure that the incremental encoder has direct and fixed contact with the drive system and that the friction wheel rotates without slipping.

5.6 Removing the bar code scanner

Removal of the components is described in *chapter 8.5.1 Removing the bar code scanner, page 78*.

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6 Electrical installation

6.1 Overview of installation sequence

Important Electrical installation must be performed by qualified staff.

The following list provides an overview of a typical installation sequence:

- Connect bar code scanner to connection module CDB620 or CDM420
- Wire the bar code scanner's data and function interfaces
- Connect connection module to the supply voltage
- Connect PC for start-up and configuration (RS-232 or Ethernet)

The actual installation work which has to be carried out depends on the respective system configuration and the version of the bar code scanner (see the following chapter). Once electrical installation has been completed, the bar code scanner is started up and configured (see *chapter 7 Startup and configuration, page 67*).

6.2 Electrical installation preparations

The following general requirements should be observed for the electrical installation:

- Supply voltage 18 ... 30 V DC (functional extra-low voltage in accordance with IEC 60364-4-41 (VDE 0100 Part 410)) and min. 10 W output power
  - Using connection module CDB620/CDM420: supply voltage provided by terminals of the connection module

    - or -

    Free wiring by customer (without connection module CDB620/CDM420): connection of supply voltage e.g. by cable no. 6034418 (15-pole D-Sub-HD socket to open end)
- With external reading pulsing
  - Appropriate reading pulse sensor (start/stop), e. g. photoelectric reflex switch: for registering an object in the reading area
  - Additional appropriate reading pulse sensor (stop), e.g. photoelectric reflex switch: For registering the end of pulse with extended external reading pulse
- Appropriate incremental encoder: For separating identical bar codes
- Host computer with RS-232, RS-422/485 data interface or Ethernet: For further processing the reading data
- Connection cables: see ordering information for " Bar Code Scanner CLV600" product information.

Important The possible distance between the bar code scanner and the host computer depends on the physical version of the selected host interface and the set data transfer rate.

The following resources are required for electrical installation:

- Tool
- Digital measuring device (current/voltage measurement)

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6.3 Electrical connections and cables

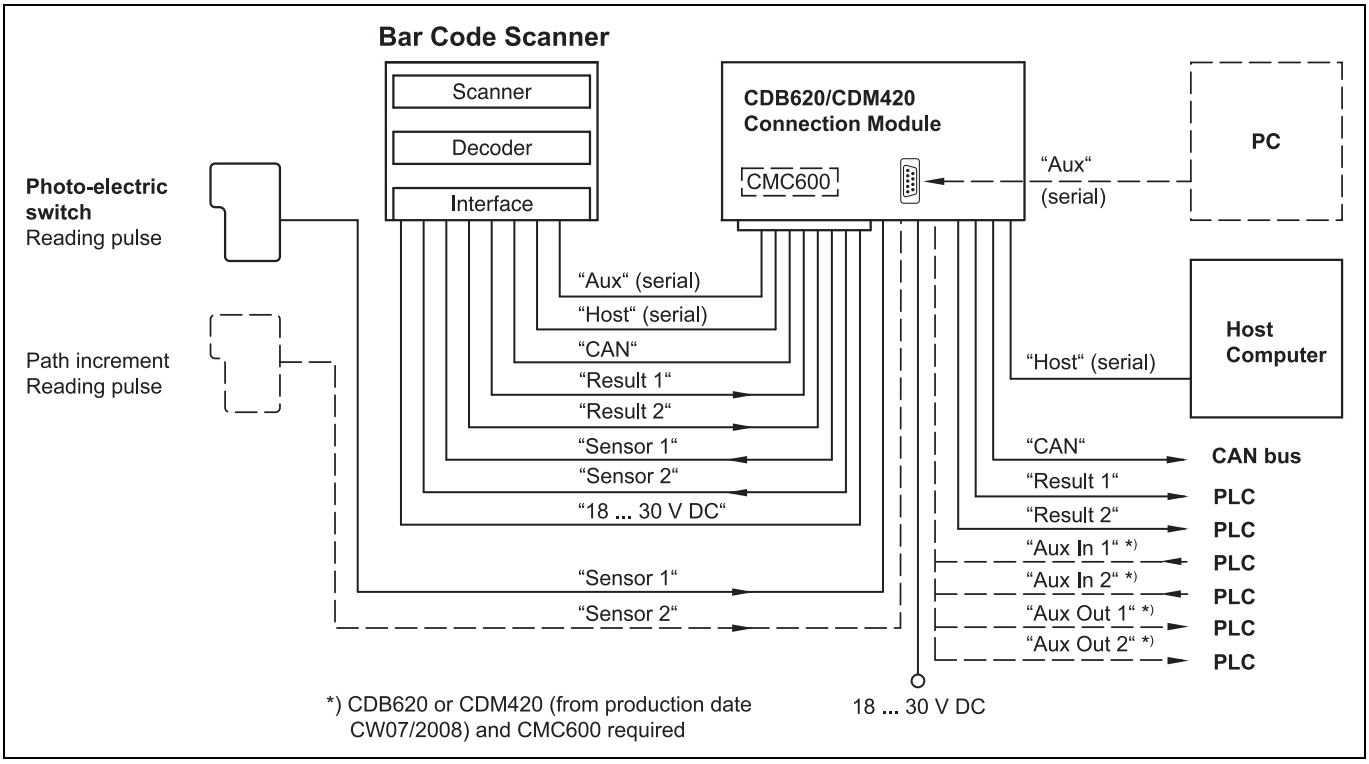

Fig. 6-1: Standard version: Electrical connections at the bar code scanner with connection cable

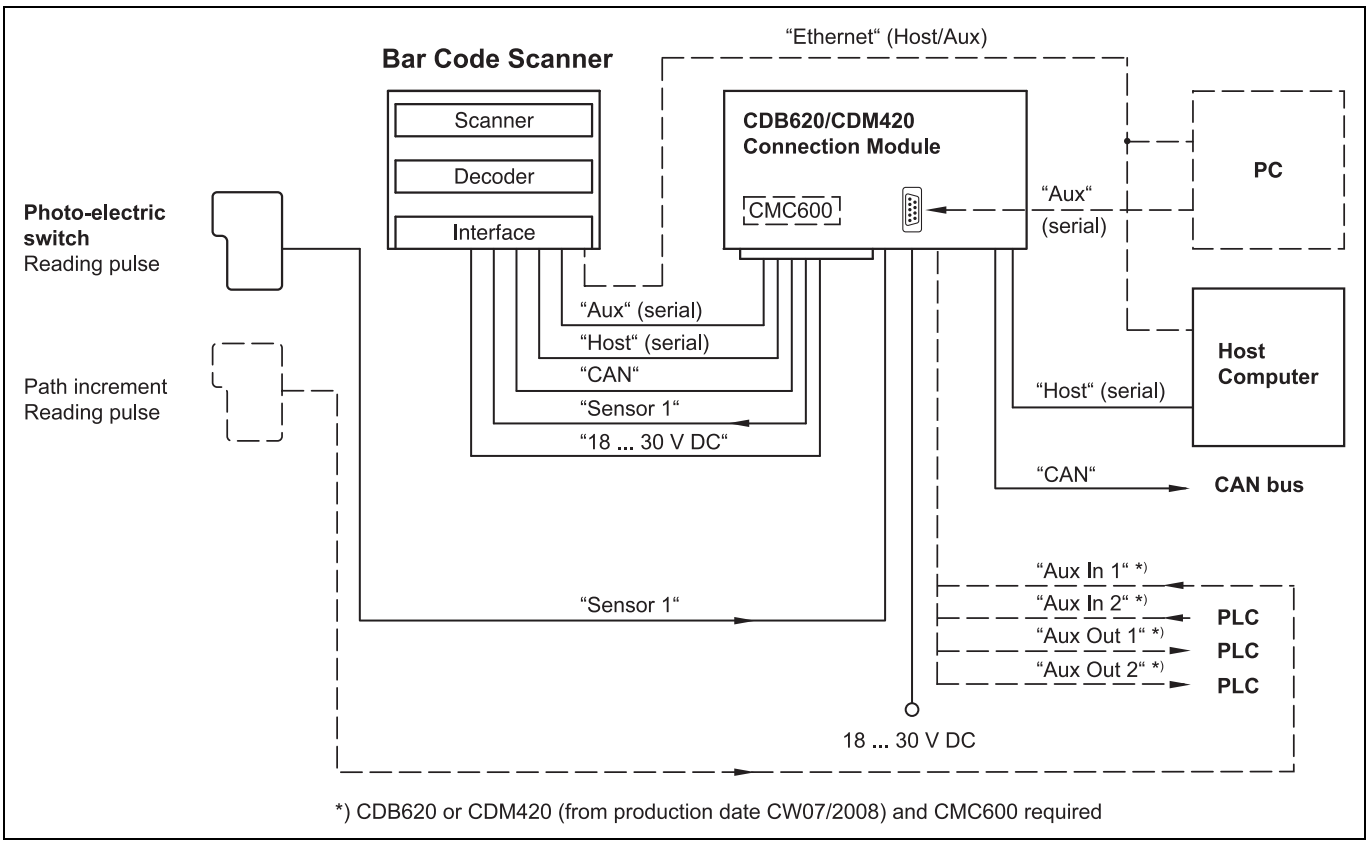

Fig. 6-2: Ethernet version: Electrical connections at the bar code scanner with connector unit

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6.3.1 Electrical connections at the bar code scanner

Important Prerequisites for enclosure rating IP 65:

- The black rubber cover of the memory card (optional) has to be closed and lie flush against the device.
- The connectors attached to the used electrical connections of the Ethernet version have to be firmly screwed.

The same applies to the EMC requirement (ESD) according to CE.

Depending on the device version, the following electrical connections are available at the bar code scanner:

Device version	Connection (design)	Interfaces	For connection to
CLV65x-0**00**0 CLV65x-1**00**0 CLV65x-2**00**0 CLV65x-3**00**0 CLV65x-6**00**0	Cable with connector (D-Sub-HD, 15-pole, plug)	• RS-232 • RS-422/485 • CAN • Two digital inputs • Two digital outputs • Power supply	e. g. connection module CDB620 or CDM420

Tab. 6-1: Electrical connections to the bar code scanner with a fixed cable and connector (standard version)

Device version	Connection (design)	Interfaces	For connection to
CLV65x-0**12**0 CLV65x-1**12**0 CLV65x-2**12**0 CLV65x-3**12**0 CLV65x-6**12**0	Connector 1 at the connector unit (M-12, 4-pole, socket)	• Ethernet	Network provided by the client
	Connector 2 at the connector unit M-12, 12-pole, plug	• RS-232 • RS-422/485 • CAN • One digital input • Power supply	e. g. connection module CDB620 or CDM420

Tab. 6-2: Electrical connections to the bar code scanner with connector unit (Ethernet version)

Important Additional digital inputs and outputs are available at connection module CDB620/CDM420 (available from week 07/2008) in combination with the parameter memory module CMC600.

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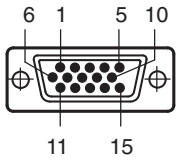
6.3.2 Bar code scanner connections to the cable and connector (standard version)



Pin	Signal	Function
1	18 ... 30 V DC	Supply voltage
2	RxD (Aux)	Aux interface (receiver)
3	TxD (Aux)	Aux interface (sender)
4	Sensor 2	Digital switching input (adjustable function, e. g. external reading pulse)
5	GND	Ground
6	RD+ (RS-422/485)	Host interface (receiver)
7	RD– (RS-422/485); RxD (RS-232)	Host interface (receiver)
8	TD+ (RS-422/485)	Host interface (sender)
9	TD– (RS-422/485); TxD (RS-232)	Host interface (sender)
10	CAN H	CAN bus (IN/OUT)
11	CAN L	CAN bus (IN/OUT)
12	Result 1	Digital switching output, adjustable function
13	Result 2	Digital switching output, adjustable function
14	Sensor 1	Digital switching input for external reading pulse
15	SensGND	Common ground for the switching inputs
–	–	Shield

Tab. 6-3: Standard version: Pin assignment of the 15-pole D-Sub-HD cable connector

6.3.3 Bar code scanner's connections with connector unit (Ethernet version)

Pin	Signal	Function
1	TD+	Transmitter+
2	RD+	Receiver+
3	TD–	Transmitter-
4	RD–	Receiver-
–	–	Shield

Tab. 6-4: Ethernet version: Pin assignment of the 4-pole M12 socket

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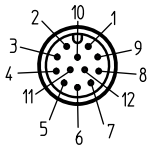

Pin	Signal	Function
1	GND	Ground
2	18 ... 30 V DC	Supply voltage
3	CAN L	CAN bus (IN/OUT)
4	CAN H	CAN bus (IN/OUT)
5	TD+ (RS-422/485)	Host interface (sender)
6	TD– (RS-422/485); TxD (RS-232)	Host interface (sender)
7	TxD (Aux)	Aux interface (sender)
8	RxD (Aux)	Aux interface (receiver)
9	SensGND	Switching input Sensor 1 ground
10	Sensor 1	Digital switching input (external reading pulse)
11	RD+ (RS-422/485)	Host interface (receiver)
12	RD– (RS-422/485); RxD (RS-232)	Host interface (receiver)
–	–	Shield

Tab. 6-5: Ethernet version: Pin assignment on the 12-pole M12 plug

Important The "Sensor 2", "Result 1" and "Result 2" connections are only available on the bar code scanner with a cable and connector (standard version) and for the Ethernet version via the CDB620/CDM420 connection module in combination with the parameter memory module CMC600.

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6.4 Performing electrical installation

Important To ensure secure fastening of the connected connectors and adherence to the enclosure rating, the knurled nuts/coupling rings of the M12 connectors have to be tightened or the cable connectors have to be secured.

1. Connect or release current linkages only under de-energised conditions.
2. All wire cross sections and their shields on customer side have to be selected and implemented according to valid engineering standards.

NOTICE

Damage to the connector unit at the bar code scanner due to overwinding.

The connector unit at the bar code scanner has two end positions.

- ➢ Never turn the connector unit more than 180° in one direction (comming from one of the end positions).
- ➢ Always rotate the connector unit in the direction of the laser diode name.

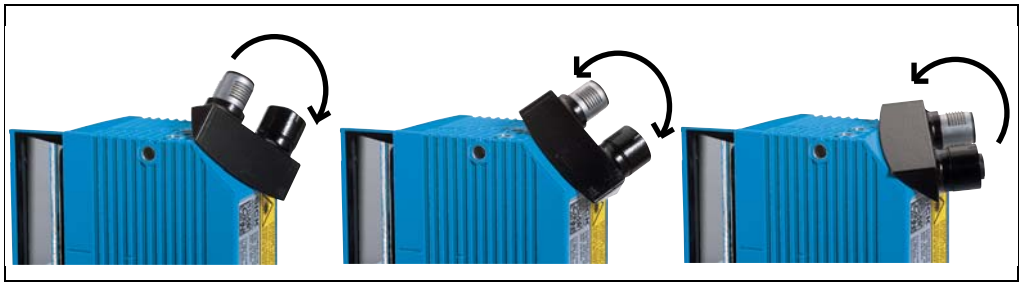

Fig. 6-3: Direction of rotation of the connector unit

6.4.1 Connecting the power supply for the bar code scanner

The bar code scanner requires a supply voltage of 18 ... 30 V (functional extra-low voltage in accordance with IEC 60364-4-41 (VDE 0100 Part 410)). The functional extra-low voltage can be created using a safety transformer in accordance with IEC 742 (VDE 0551). The maximum current consumption is 8.5 ... 9.5 W.

The bar code scanner is supplied with 18 ... 30 V DC via connection module CDB620 or CDM420. If the power supply module CMP400/CMP490 is used, the input voltage is 100 ... 250 V AC/ 50 ... 60 Hz at the module.

Important **The output circuit of the power supply must be electrically separated from the input circuit. This is usually created by means of a safety transformer in accordance with IEC 742 (VDE 0551).**

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Connecting the supply voltage

When wiring the bar code scanner using connection module CDB620 or CDM420, the bar code scanner's data and function interfaces are contacted to the connection module together with the power supply.

1. Ensure that the connection module's supply voltage has been switched off.
2. Standard version: Connect the bar code scanner's 15-pole cable plug to the connection module's 15-pole socket and screw it tight.

   - or -

   Ethernet version: Connect the bar code scanner's 12-pole plug via a corresponding cable (e.g. 2042916) to the connection module's 15-pole socket and screw it tight.

6.4.2 Wiring serial data interfaces

The maximum data transfer rate depends on the cable length and the interface type.

Interface type	Transfer rate	Distance to the host
RS 232	Up to 19,200 Bd	Max. 10 m (32.8 ft)
	38,400 ... 57,600 Bd	Max. 3 m (9.84 ft)
	115,200 Bd	Max. 2 m (6.56 ft)
RS-422/485[1)]	Max. 38,400 Bd	Max. 1,200 m (3,937 ft)
	Max. 115,200 Bd	Max. 500 m (1,640 ft)
[1)] With corresponding line termination according to specification		

Tab. 6-6: Recommended maximum cable lengths, depending on the selected data transfer rate

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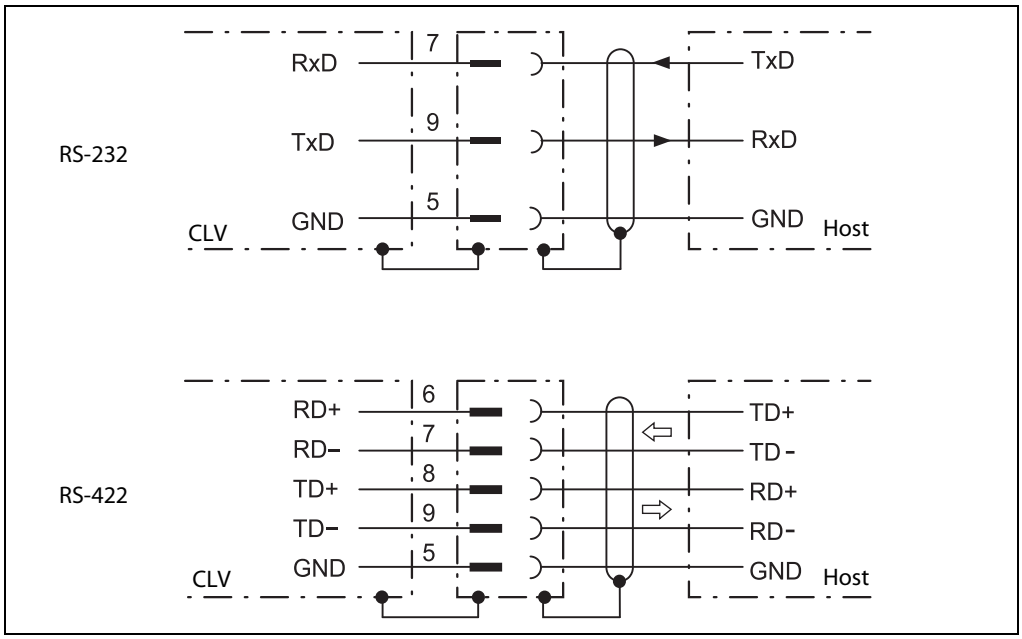

Fig. 6-4: Wiring the serial host data interfaces (RS-232 or RS-422) on the 15-pole D-Sub-HD plug

Pin assignment for the serial auxiliary data interface on the 15-pole D-Sub-HD plug:

- RxD = Pin 2
- TxD = Pin 3
- GND = Pin 5

NOTICE

Damage to the interface module!

Incorrect wiring of the serial data interfaces can damage electronic components in the bar code scanner.

➢ Observe information about wiring the serial data interface.

➢ Check the wiring carefully before switching on the bar code scanner.

1. Connect the bar code scanner's serial interface to the host in accordance with the EMC regulations using shielded cables.

   Adhere to the maximum cable lengths.

2. To prevent interference, do not lay cables parallel to power supply cables and motor lines over a longer distance, e. g. in cable channels.

Terminating the RS-422 data interface

Termination can be performed either in connection module CDB620 or CDM420. See operating instructions "Connection module CDB620" or "Connection module CDM420".

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6.4.3 Wiring CAN interface

To wire and configure the bar code scanner's CAN interface for use in the CAN-SENSOR-network, see the operating instructions "Using the CAN Interface“ (no. 8009180, English).

6.4.4 Wiring Ethernet interface

Aux and host interface communication can also be executed in parallel via the Ethernet interface.

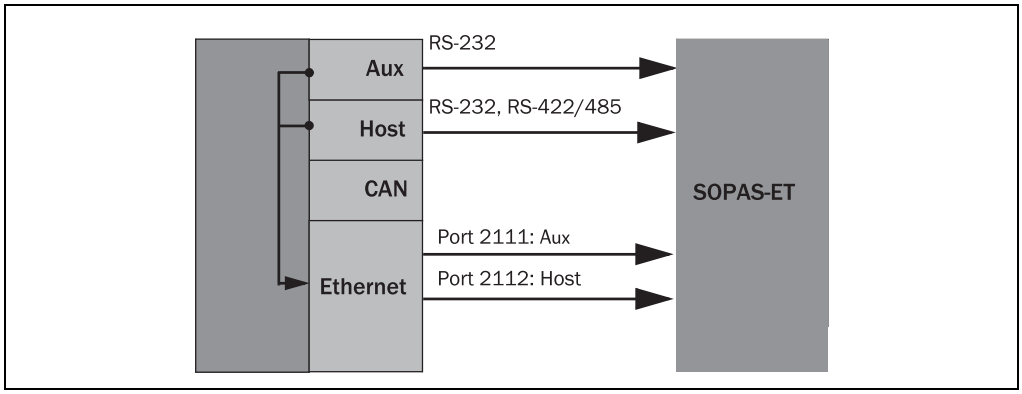

Fig. 6-5: Function of the Ethernet interface

Important The Ethernet interface has an auto-MDIX function. This automatically sets the speed and any cross connection that is required.

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6.4.5 Wiring switching inputs

If the bar code scanner's reading process should be triggered by an external sensor, the reading pulse sensor is connected to the "**Sensor 1**" switching input.

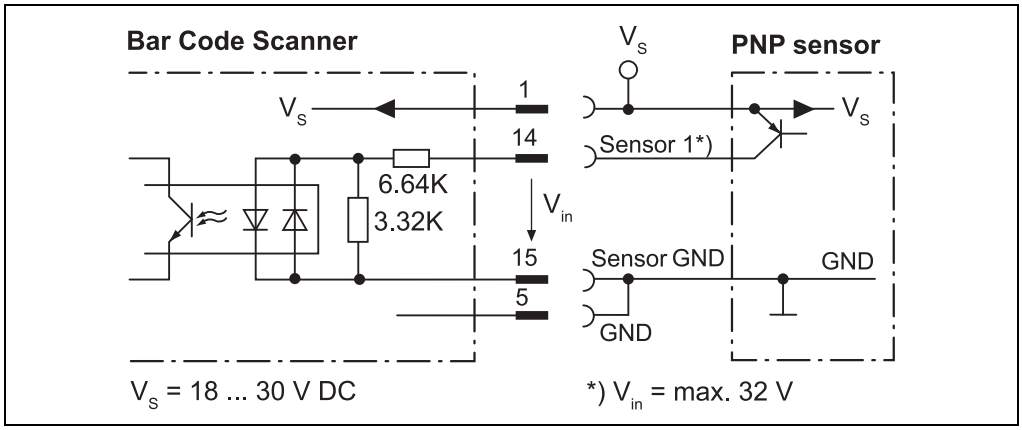

Fig. 6-6: Wiring the “Sensor 1“ switching input on the 15-pole D-Sub-HD plug

The "**Sensor 2**" switching input has the following functions, among others:

Trigger source for

- Incremental encoder input
- Reading pulse generator for reading pulse end

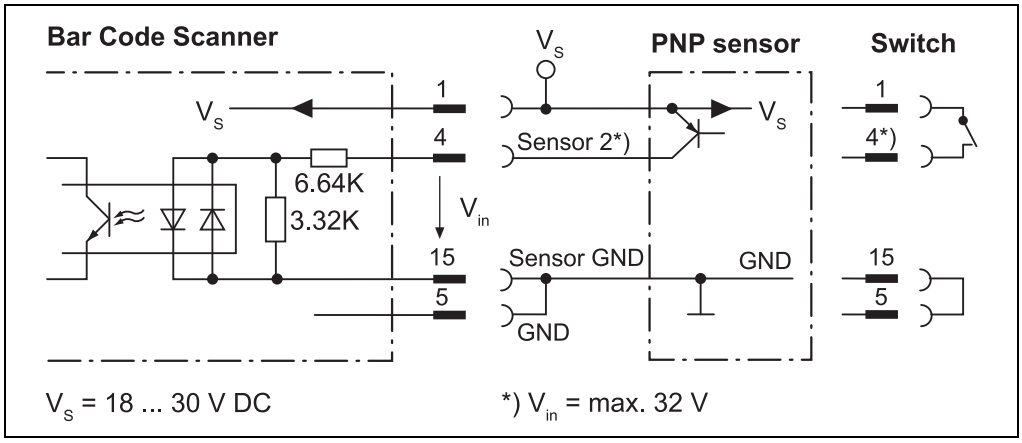

Fig. 6-7: Wiring the “Sensor 2“ switching input on the 15-pole D-Sub-HD plug

Important The ratings for "Sensor 1" and "Sensor 2" are identical.

Switching behaviour	Power fed to the input opens the internal reading gate of the bar code scanner. (Default setting: active high; debouncing: max. 30 ms (standard))
Features	– Optodecoupled, reverse polarity protected – Can be wired with the PNP output of a sensor
Electrical values	Low: $\|V_{in}\| \leq 2$ V; $\|I_{in}\| \leq 0.3$ mA High: 6 V $\leq \|V_{in}\| \leq 32$ V; 0.7 mA $\leq \|I_{in}\| \leq 5.0$ mA

Tab. 6-7: Ratings for the switching inputs

➢ Connect switching inputs depending on application.

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To wire the switching inputs using connection module CDB620 or CDM420, see operating instructions "Connection Module CDB620" (no. 8012119, German/English) or "Connection Module CDM420" (no. 8010004, German/English).

6.4.6 Wiring switching outputs

Various functions for outputting the result status independently of each other can be allocated to the two switching outputs "Result 1" and "Result 2". If the allocated result occurs in the reading process, the corresponding switching output at the end of the reading pulse is live for the selected impulse duration.

Important The “Result“ LED is not coupled with one of the “Result 1“ or "Result 2" outputs.

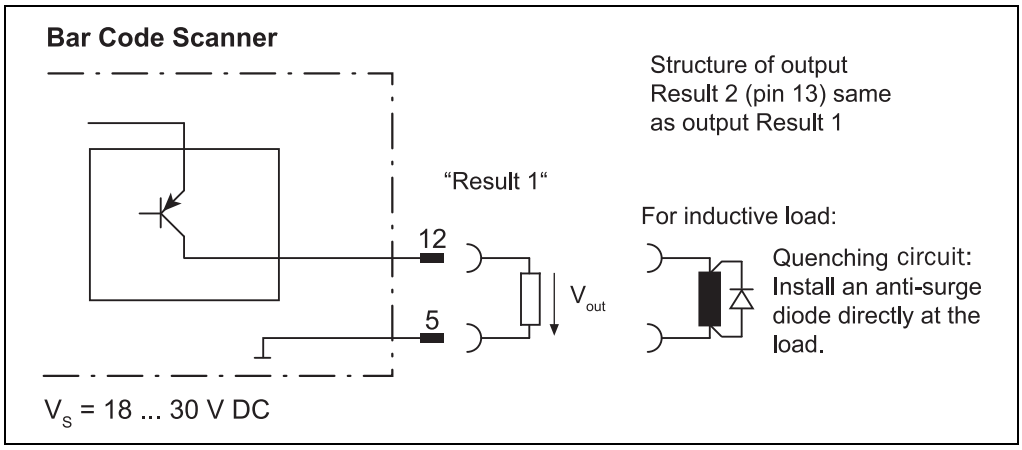

Fig. 6-8: Possible wiring of the "Result 1" switching output on the 15-pole D-Sub-HD plug

Important The ratings of the two switching outputs are identical.

Switching behaviour	PNP switching against the distribution voltage V_S
Features	Short-circuit proof and temperature-protected, Galvanically not separated from V_S
Electrical values	$0\ V \le V_{out} \le V_S$ Guaranteed: $(V_S - 1.5\ V) \le V_{out} \le V_S$ with $I_{out} \le 100\ mA$

Tab. 6-8: Ratings for the switching outputs

Important **Capacitance loads** at the switching output affect the switching behaviour. Threshold is a max. capacitance of 100 nF. Exeeding this value can lead to unwanted pulsing behaviour of the output.

1. Connect switching outputs depending on application.
2. Wire the switching outputs with a load resistance to test the switching functions using a high-resistance digital voltmeter.

   Indication of incorrect voltages/switching statuses is avoided this way.

To wire the switching outputs using connection module CDB620 or CDM420, see the operating instructions "Connection Module CDB620" (no. 8012119, German/English) or "Connection Module CDM420-0001" (no. 8010004, German/English).

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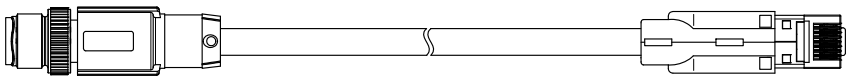
6.5 Pin assignment and wire colour assignment of the assembled cables

6.5.1 Pin assignment of the assembled cables

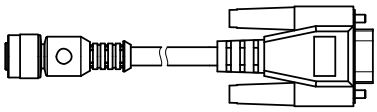
Cable no. 6034414, 6029630, 6034415, 6030928 (Ethernet version)



Pin (4-pole)	**Signal**	**Function**	**Pin** (6-pole)
1	TD+	Transmitter+	1
3	TD–	Transmitter–	2
2	RD+	Receiver+	3
–	–	–	4
–	–	–	5
4	RD–	Receiver–	6
–	–	Shield	–

Tab. 6-9: Pin assignment of the 4-pole M12 plug and the 6-pole RJ45 plug

Cable no. 2042916, 2041834, 2042914, 2042915 (Ethernet version)



Pin (12-pole)	**Signal**	**Function**	**Pin** (15-pole)
2	18 ... 30 V DC	Supply voltage	1
8	RxD (Aux)	Aux interface (receiver)	2
7	TxD (Aux)	Aux interface (sender)	3
–	–	–	4
1	GND	Ground	5
11	RD+ (RS-422/485)	Host interface (receiver)	6
12	RD– (RS-422/485); RxD (RS-232)	Host interface (receiver)	7
5	TD+ (RS-422/485)	Host interface (sender)	8
6	TD– (RS-422/485); TxD (RS-232)	Host interface (sender)	9
4	CAN H	CAN bus (IN/OUT)	10
3	CAN L	CAN bus (IN/OUT)	11
–	–	–	12
–	–	–	13
10	Sensor 1	Digital switching input for external reading pulse	14
9	SensGND	Common ground for the switching inputs	15
–	–	Shield	–

Tab. 6-10: Pin assignment of the 12-pole M12 socket and the 15-pole D-Sub-HD plug

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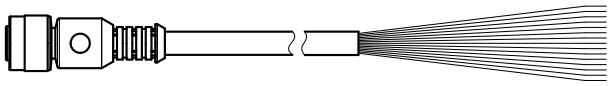
6.5.2 Pin assignment and wire colour assignment of the assembled cables with an open end

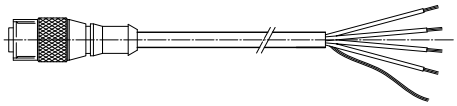
Cable no. 6034605 (Ethernet version)



Pin (12-pole)	**Signal**	**Function**	**Wire colour**
1	GND	Ground	brown
2	18 ... 30 V DC	Supply voltage	blue
3	CAN L	CAN bus (IN/OUT)	white
4	CAN H	CAN bus (IN/OUT)	green
5	TD+ (RS-422/485)	Host interface (sender)	pink
6	TD– (RS-422/485); TxD (RS-232)	Host interface (sender)	Yellow
7	TxD (Aux)	Aux interface (sender)	black
8	RxD (Aux)	Aux interface (receiver)	grey
9	SensGND	Common ground for the switching inputs	Red
10	Sensor 1	Digital switching input for external reading pulse	violet
11	RD+ (RS-422/485)	Host interface (receiver)	grey-pink
12	RD– (RS-422/485); RxD (RS-232)	Host interface (receiver)	red-blue

Tab. 6-11: Pin assignment of the 12-pole M12 socket and wire colours at the open end

Cable no. 6012166



Pin (5-pole)	**Signal**	**Function**	**Wire colour**
1	–	Shield	–
2	+24 V DC	Supply voltage	Red
3	GND	Ground	black
4	CAN H	CAN bus (IN/OUT)	white
5	CAN L	CAN bus (IN/OUT)	blue

Tab. 6-12: Pin assignment of the 5-pole M12 plug and wire colours at the open end

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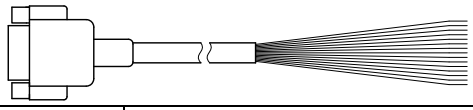
Cable no. 6034418 (Standard version)



Pin (15-pole)	**Signal**	**Function**	**Wire colour**
1	18 ... 30 V DC	Supply voltage	Red
2	RxD (Aux)	Aux interface (receiver)	violet
3	TxD (Aux)	Aux interface (sender)	Yellow
4	Sensor 2	Digital switching input (adjustable function, e. g. external reading pulse)	red-black
5	GND	Ground	black
6	RD+ (RS-422/485)	Host interface (receiver)	light blue
7	RD– (RS-422/485); RxD (RS-232)	Host interface (receiver)	blue
8	TD+ (RS-422/485)	Host interface (sender)	light grey-turquoise
9	TD– (RS-422/485); TxD (RS-232)	Host interface (sender)	green
10	CAN H	CAN bus (IN/OUT)	grey
11	CAN L	CAN bus (IN/OUT)	pink
12	Result 1	Digital switching output, adjustable function	brown
13	Result 2	Digital switching output, adjustable function	orange
14	Sensor 1	Digital switching input for external reading pulse	white
15	SensGND	Common ground for the switching inputs	white-black

Tab. 6-13: Pin assignment of the 15-pole D-Sub-HD socket and wire colours at the open cable end

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7 Startup and configuration

Startup, adjustments, configuration and diagnosis are carried out via the SOPAS-ET configuration software. A simple reading rate diagnosis (integrated bargraph display) can, among other things, be called up independently via two buttons on the device (see *chapter 4.7.3 Buttons on the bar code scanner housing, page 39*).

7.1 Overview of the startup procedure

- Start the bar code scanner with the factory default settings
- Install SOPAS-ET configuration software
- Connect the PC with the SOPAS-ET configuration software to the bar code scanner
- In order to optimise the functionality of the bar code scanner, adjust and configure the bar code scanner, if necessary
- Check correct functioning of the bar code scanner in reading operation

7.2 SOPAS-ET configuration software

The SOPAS-ET configuration software optimises the bar code scanner to the reading conditions on site. The configuration data can be saved and archived as a parameter set (project file) on the PC.

7.2.1 Functions of the SOPAS-ET configuration software for the bar code scanner (overview)

The online help in the SOPAS-ET configuration software describes the general functions and operation of the software: MENU, HELP, HELP F1

- Selecting the menu language (German, English, French, Spanish, Italian, Russian, Japanese, Chinese)
- Setup communication with the bar code scanner
- Password protected configuration for various operating levels
- Recording of data during the current mode (recording and analyzing the data of certain bar code scanner memory areas via the data recorder)
- Diagnosing the system

SOPAS-ET can also be started in **Single Device Mode**. Only one device can be configured in this mode.

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7.2.2 System requirements for the SOPAS-ET configuration software

PC system requirements:

- Recommendation: Pentium III, 500 MHz, 512 MB RAM, CD drive, RS-232 serial data interface or Ethernet interface card, mouse (recommended) and colour monitor (recommended resolution 1,024 x 768 pixels)
- Operating system Windows 2000™, Windows XP™ or Windows Vista™
- Free storage space on the hard drive: approx. 300 MB for SOPAS-ET (V. 2.14) configuration software with help files and approx. 70 MB for "Acrobat Reader"
- PC HTML browser, e.g. Internet Explorer™: For online help system of SOPAS-ET configuration software

Connection cables: see " Bar Code Scanner CLV600" product information.

7.2.3 Installing the SOPAS-ET configuration software

1. Start the PC and insert the installation CD.
2. If installation does not start automatically, call setup.exe on the CD.
3. Follow the operating instructions to conclude installation.

7.2.4 Default setting for SOPAS-ET configuration software

Parameter	Value
User interface language	English (the software has to be restarted after changes)
Units of length	Metric
User group (operating level)	Maintenance
Download parameter for changes	Immediate, temporary (bar code scanner's RAM)
Upload parameter after online switching	Automatic
Window layout	3 (project tree, help, work area)
Serial communication	COM 1: 9,600 Bd/19,200 Bd, 8 data bits, 1 stop bit, no parity

Tab. 7-1: Default setting for the SOPAS-ET configuration software (excerpt)

7.3 Establish communication with the bar code scanner

Prerequisite The TCP-IP protocol at the PC has to be active to enable communication via TCP-IP.

7.3.1 Connecting data interfaces

➢ Connect the PC and bar code scanner via one of the two data interfaces to each other.

Data interface	Comment
ETHERNET (10/100 MBit/s)	Directly connect the PC (Ethernet interface) to the ETHERNET connection of the bar code scanner.
RS 232	Directly connect the PC (serial interface) to the AUX or HOST connection of the bar code scanner using a suitable cable.

Tab. 7-2: Connection between the PC with SOPAS-ET configuration software and the bar code scanner

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7.3.2 Starting the SOPAS-ET configuration software and calling the scan assistant

1. Switch the power supply to the bar code scanner on.
   The bar code scanner performs a self-test and is initialised.
2. Switch on the PC and start the SOPAS-ET configuration software.
   The SOPAS-ET configuration software opens the program window with an English program interface by default.
3. In order to change the language setting, click on CANCEL and change the language of the program interface to e. g. GERMAN/DEUTSCH via the menu TOOLS/OPTIONS.
4. Once the language setting has been changed, shut down the SOPAS-ET configuration software and restart it.
5. In the dialog window, select the option CREATE A NEW PROJECT and click on OK to confirm it.
6. Click on the CONFIGURATION button in the main window under SCAN ASSISTANT.
   The SCAN ASSISTANT dialog window appears.

7.3.3 Configuring the Ethernet connection

TIP To establish a connection quickly and easily via Ethernet, the SOPAS-ET configuration software has a CONNECTION WIZARD in the TOOLS menu.

Manual configuration:

1. In the dialog window SCAN ASSITANT under INTERNET PROTOCOL/INTERNET PROTOCOL (IP), check the check box for ENABLE IP COMMUNICATION.
2. Click on the ADD... button.
3. Enter the IP address of the bar code scanner and confirm it by pressing OK in the dialog window.
   The dialog window closes. A new entry appears in the IP ADDRESS CONFIGURATION list.
4. Click on OK to confirm settings.
   The dialog window ADVANCED SCAN SETTINGS closes.

7.3.4 Configuring the serial connection

1. In the dialog window SCAN ASSISTANT under SERIAL PORT/STANDARD PROTOCOL, check the check box for ENABLE SERIAL COMMUNICATION.
2. Click on the ADVANCED... button.
3. Under SELECT BAUDRATE(S) deactivate all the baud rates except 57.6 KBD.
4. Select the following PORT SETTINGS: 8 data bits, no parity, 1 stop bit.
5. Click on OK to confirm settings.
   The dialog window ADVANCED SCAN SETTINGS closes.

7.3.5 Carrying out a scan

1. In the dialog window SCAN ASSISTANT click on the NETWORK SCAN button.
2. Select the listed devices (CLV65x) and confirm via ADD DEVICE.
   Connected devices are searched for via the connection. The SOPAS-ET configuration software inserts the found devices in the project tree and uploads the current parameter set (SYNC CHECK).
3. For configuration of the devices see *chapter 7.4.2 Configuring the bar code scanner, page 71*.

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7.4 First startup

The SOPAS-ET configuration software optimises the bar code scanner to the reading conditions on site. Starting point for this is the factory default setting which can be adjusted to optimise the bar code scanner. The SOPAS-ET configuration software is used to create an application-specific parameter set which can be loaded permanently into the bar code scanner and saved/archived as a project file (spr file with configuration data) on the PC.

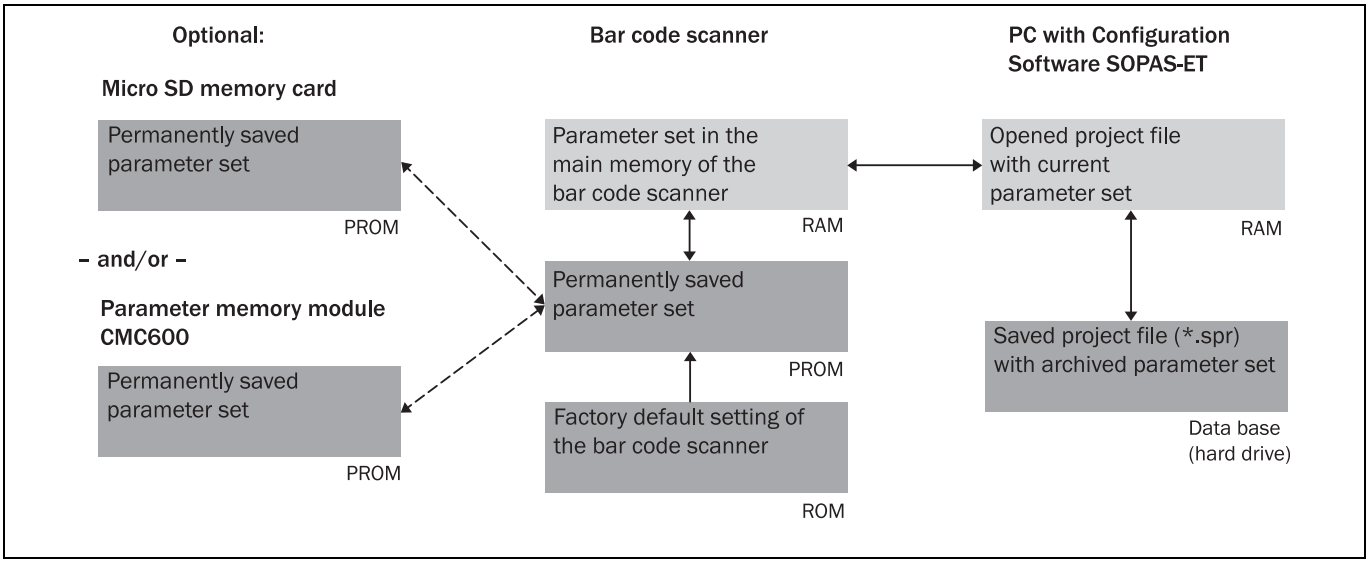

Fig. 7-1: Configuration with SOPAS-ET and storage the parameter set

If the bar code scanner is optionally connected to a Micro SD memory card (see *chapter 4.7.4 Parameter set on the Micro SD memory card (optional), page 42*) or connected to a module with parameter memory mode CMC600, the parameter set is saved permanently to the memory card, or to the CMC600 repectively, with every permanent storage of the parameter set to the bar code scanner.

After the bar code scanner is restarted, the data from the memory card, repectively from the CMC600 is automatically transferred to the bar code scanner. As such, a bar code scanner can be exchanged, for example, without losing configuration data (see *chapter 8.5 Replacing a bar code scanner, page 78*). If there is a memory card as well as a CMC600, the bar code scanner takes the parameter set from the CMC600.

7.4.1 Overview of the startup procedure

- Connect data interfaces of the PC and the bar code scanner
- Start the SOPAS-ET configuration software and create a new project file
- Configure the scan assistant (activate PC communication)
- Establish communication with the bar code scanner
- Accept current configuration of the bar code scanner in the project tree
- Log on as an "Authorized client" to the bar code scanner
- Configure the bar code scanner for use
- If necessary, apply the "Event Monitor" diagnosis tool
- Load the optimised configuration into the bar code scanner and save permanently
- Save the project file with the configuration data of the bar code scanner on the PC

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7.4.2 Configuring the bar code scanner

All configurable parameters for the bar code scanner are grouped into a device description (jar-file) for the SOPAS-ET configuration software. The device description's project tree acts as a guideline for the configuration.

The function of each respective parameter is explained in a context-sensitive manner in an online help (F1 key). The valid value range and the default setting list the display window PARAMETER INFO (right mouse button, when the cursor is positioned over the parameter).

In order to configure a device via the SOPAS-ET configuration software, the respective operating level has to be selected in advance. After the start, the SOPAS-ET configuration software functions at the operating level "MAINTENANCE".

1. In the menu bar under TOOLS select the command LOGIN DEVICE.
2. Select the entry AUTHORIZED CLIENT in the dialog window under USERLEVEL in the list box.
   If the parameter set is password-protected, enter the password "client" in PASSWORD.
   Activate/deactivate password protection on the PARAMETER register tab.
3. Click on OK to confirm the dialog window.
   The previously greyed out parameters on the register tabs are now accessible.

7.4.3 Permanently load changed parameter sets into the device

Changed parameter values are immediately transferred to the bar code scanner's main memory (RAM) depending on the option (“Immediate download“). To ensure that the changes remain even after the bar code scanner is restarted, the configuration has to be permanently saved in the bar code scanner's PROM.

➢ In order to load the current settings permanently in the bar code scanner, select the command PARAMETER/SAVE PERMANENT in the menu bar under CLV65X or click on in the tool bar.

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7.4.4 Save, display and print the current parameter set

When archiving a parameter set it is recommended to not only save the project file on the PC but also print out the contents of the file.

1. In order to save the current parameter set, select the menu item SAVE PROJECT AS in the menu bar under PROJECT.
2. Enter a file name in the dialog window and confirm it via SAVE.
   The SOPAS-ET configuration software saves the current settings in a configuration file "*.spr".
3. In order to print out the current parameter set, select the command PRINT/PRINT PREVIEW in the menu bar under PROJECT.
   The SOPAS-ET configuration software displays a preview of a table with a list of all the parameter values.
4. Click on in the tool bar at the top of the dialog window.
   The dialog window PRINT for the printer configuration appears.
5. Edit setting accordingly and confirm with OK.
   The current project settings are printed as a table on several pages.

TIP To save the current parameter set as a PDF, select the PRINT/SAVE AS PDF FILE command in the menu bar under PROJECT.

7.5 Default setting

The values of the default setting are permanently saved in the bar code scanner (ROM) and in the database of the SOPAS-ET configuration software in the device-specific jar file (see *chapter 7.4 First startup, page 70*). A PC is not required to start up the bar code scanner with the default setting.

7.5.1 Resetting the default setting in the bar code scanner

Prerequisite The SOPAS-ET configuration software is connected online to the bar code scanner.

Two default setting types can be called up via the SOPAS-ET configuration software:

- Complete default setting (LOAD FACTORY DEFAULT)
  SOPAS-ET resets all parameter values of the bar code scanner to default. Settings which have been previously made for the communication parameters of the Ethernet interfaces or serial data interfaces (e.g. Ethernet address) are overwritten. The connection(s) to the bar code scanner might be interrupted and has (have) to be reconfigured.
- Application-specific default setting (LOAD APPLICATION DEFAULT)
  SOPAS-ET resets the parameter values of the bar code scanner but does not change the communication parameters. Settings which have been previously made for the communication parameters of the Ethernet interfaces or serial data interfaces are kept and the current connection(s) to the bar code scanner remain(s) established.

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1. In order to discard changes to the parameter set as described above, select the corresponding command in the menu bar under CLV65x.

   The SOPAS-ET configuration software loads the default setting from the bar code scanner and displays the parameter values in the register tabs. In the bar code scanner, the default setting will first be active in the temporary main memory only.

   The default setting can also be saved on or printed via the PC (see *chapter 7.4.4 Save, display and print the current parameter set, page 72*).
2. In the menu bar under TOOLS select the command LOGIN DEVICE.
3. Select the entry AUTHORIZED CLIENT in the dialog window under USERLEVEL in the list box.

   If the parameter set is password-protected, enter the password "client" in PASSWORD.
4. Click on OK to confirm the dialog window.
5. In the menu bar under CLV65x select the command PARAMETER/SAVE PERMANENT.

   The SOPAS-ET configuration software transfers the default setting to the permanent parameter memory (PROM) of the bar code scanner.

   If the bar code scanner is equiped with the Micro SD memory card or connected to a connection module CDB620/CDM420 with parameter memory module CMC600, the default setting will be permanently transferred to parameter memory CMC600 or memory card respectively.

Important Once the default setting has been restored, password-protection is deactivated.

7.6 Adjusting the bar code scanner

7.6.1 Adjusting the bar code scanner

To completely adjust the bar code scanner, the electrical installation must be complete and the device must be operated (see *chapter 6 Electrical installation, page 53* and *chapter 7 Startup and configuration, page 67*).

1. Align the bar code scanner in such a way that the angle between the scanning line and the bar code's lines is almost 90°.
2. To avoid disruptive reflections, rotate the bar code scanner from the plumb line so that the emitting light meets the bar code at an angle of approx. 105° (line scanner) (see *chapter 5.3.4 Avoiding surface reflections, page 48*).
3. Manually bring objects with bar codes sequentially into the bar code scanner's visual range. The default setting of the focus position is 285 mm (11.2 in) from the reading window. Check the reading result using the SOPAS-ET configuration software.

   Move objects in different positions (angles) to the reading area and ensure that the thresholds of the permitted reading angles are not exceeded.
4. Align the bar code scanner in such a way that the good read rate is between 70 and 100%.
5. Tighten the screws on the bar code scanner.

   The bar code scanner is aligned with the bar code.

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8 Maintenance

8.1 Maintenance during operation

The bar code scanner functions maintenance free. Maintenance is not required to ensure compliance with the bar code scanner's laser class 2.

Important **Do not open the bar code scanner's housing. If the device is opened, the SICK AG warranty shall not apply.**

8.2 Cleaning the bar code scanner

Recommendation In order to make use of the full optical reading capacity of the bar code scanner, the reading window should be checked regularly (e. g. weekly) for soiling. This is especially recommended when operating the device in harsh conditions (dust, abrasion, humidity, finger prints, etc.).

⚠ WARNING

Damage to the eyes through laser radiation!

The bar code scanner operates with an red light laser of class 2. Looking at the laser's light path for a longer period of time can damage the eye's retina.

The entire reading window is the LED radiation outlet opening.

Caution – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- ➢ Never look directly into the light path (similar to sun light).
- ➢ Never direct the device's laser beam at the eyes of persons.
- ➢ When installing and aligning the bar code scanner, avoid laser beam reflections from reflective surfaces.
- ➢ Do not open the housing. (Opening does not interrupt the activation of the laser diode by the reading pulsing.)
- ➢ Always observe the latest valid version of laser protection regulations.

The type place displays the window material used for the reading window: CLV65x-xxxy

- y = 0: Glass
- y = 1: Plastic

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8.2.1 Cleaning the reading window

NOTICE

Damage to the reading window!

Reduced reading capacity due to scratches or smears on the reading window!

The reading window for versions CLV65x-xxx0 is made of glass.

- ➢ Do not use aggressive cleaning agents.
- ➢ Do not use cleaning agents which cause increased abrasion (e.g. powder).
- ➢ Avoid cleaning motions on the reading window which could cause scratches or abrasion.

NOTICE

Damage to the reading window!

Reduced reading capacity due to scratches or smears on the reading window!

The reading window for versions CLV65x-xxx1 is made of plastic.

- ➢ Only clean the reading window with a damp cloth.
- ➢ Use mild cleansing agents without powder. Do not use strong cleansing agents such as acetone.
- ➢ Avoid cleaning motions on the reading window which could cause scratches or abrasion.

Important Electrostatic charges cause dust particles to stick to the reading window. This effect can be combated by using anti-static SICK synthetic cleaner (no. 5600006) in combination with a SICK lens cloth (no. 4003353).

Cleaning the reading window

- ➢ Switch off device when cleaning (see laser protection).
- ➢ Use a clean, soft brush to free the (glass) reading window from dust.
- ➢ If necessary, additionally clean the (glass) reading window with a clean, damp, lint-free cloth and a mild, anti-static window cleaning fluid.
- ➢ Only clean the (plastic) reading window with a clean, damp, lint-free cloth and a mild, anti-static window cleaning fluid.

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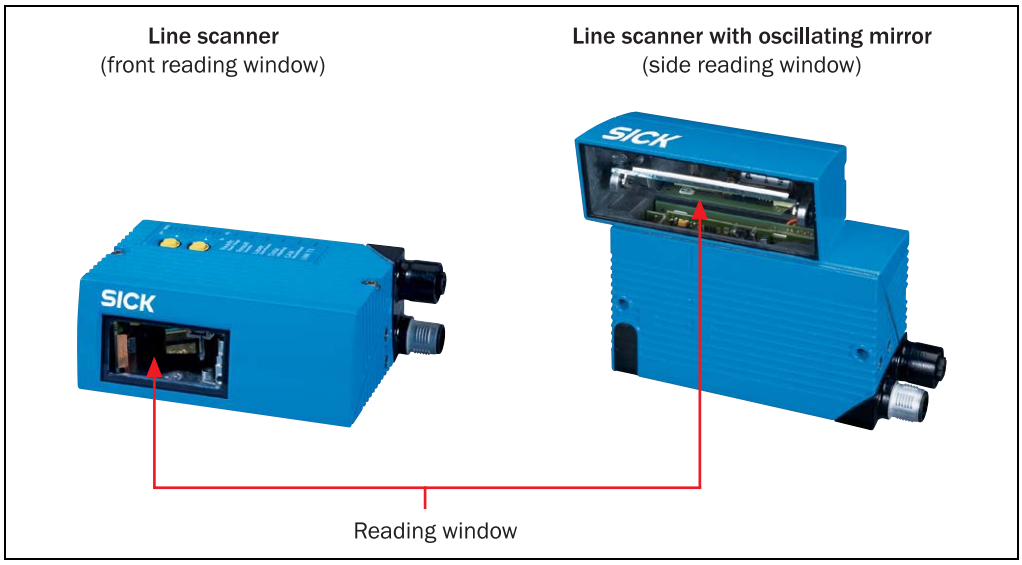

Fig. 8-1: Cleaning the reading window

If the reading window is scratched or damaged (cracked, broken), it must be replaced. Please contact the SICK Service.

8.2.2 Cleaning the housing

- ➢ Use a soft cloth to free the housing of dust.
- ➢ If necessary, also clean the LEDs on the housing.

8.3 Cleaning further optical effective surfaces

Depending on the reading system equipment, additional external sensors with optical effective surfaces can be installed (e.g. photoelectric reflex switch for external reading pulsing). Soiling of these sensors can cause incorrect switching behaviour.

- ➢ In order to prevent incorrect switching behaviour, remove soiling from the optical effective surfaces of the external sensors.

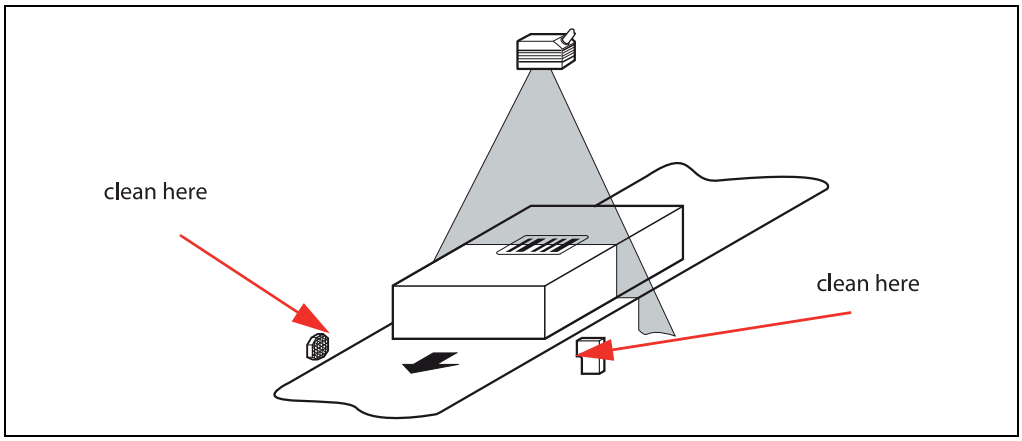

Fig. 8-2: Cleaning of the external optical sensors (reading pulse generator)

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8.4 Checking the incremental encoder

If an optional incremental encoder is used, the position of the friction wheel at the drive system should be checked at regular intervals.

➢ Ensure that the incremental encoder has direct and fixed contact with the drive system and that the friction wheel rotates without slipping.

8.5 Replacing a bar code scanner

Incorrect or damaged bar code scanners have to be removed and replaced with either new or repaired bar code scanners.

Important **Repairs to the bar code scanner should only be carried out by qualified and authorised SICK AG service staff.**

8.5.1 Removing the bar code scanner

1. Switch the power supply to the bar code scanner off.
2. Disconnect all the connection cables on the bar code scanner.
3. Remove the bar code scanner from the holder. Mark the bar code scanner's situation and alignment on the holder or environment.
4. If available, remove the Micro SD memory card (optional) with the stored parameter set from the faulty bar code scanner (see *chapter 4.7.4 Parameter set on the Micro SD memory card (optional), page 42*). To do this, carefully open the black rubber cover and slightly press on the memory card in order to unlock it.
5. Insert the memory card accordingly into the empty space of the new, turned-off bar code scanner the right way round (contacts to the back and top) until it is locked.
6. Close the rubber cover.

8.5.2 Replacing the bar code scanner

1. Align and install the new or repaired bar code scanner (see *chapter 5 Installation, page 43*). Observe any marks made previously on the holder or the environment (see *chapter 8.5.1 Removing the bar code scanner, page 78*).
2. Reconnect connection cables to the bar code scanner (see *chapter 6 Electrical installation, page 53*).
3. Switch the power supply to the bar code scanner back on.

   The bar code scanner starts with the default setting.
4. If, as an option, a Micro SD memory card has been inserted into the bar code scanner or a parameter memory module CMC600 into connection module CDB620/CDM420, the new bar code scanner will automatically load the stored parameter set from the memory card or CMC600 into its permanent memory. If both a memory card and a CMC600 are available, the bar code scanner will load the parameter set from the CMC600.

   - or -

   Without Micro SD memory card /parameter memory module CMC600: Connect to the bar code scanner via the SOPAS-ET configuration software, transfer the configuration stored on the PC via download to the bar code scanner and permanently store the configuration there.

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9 Troubleshooting

This chapter describes how errors at the bar code scanner can be recognised and eliminated.

9.1 Overview of errors and malfunctions

9.1.1 Installation error

- The bar code scanner has been unsuitably aligned to objects with bar codes (e.g. visual glare)
- Reading pulse sensor has been incorrectly positioned (e.g. internal reading gate opens too late or shuts too early)
- Incremental encoder (optional) positioned incorrectly

9.1.2 Electrical installation error

- Interfaces of the bar code scanner wired incorrectly

9.1.3 Configuration error

- Functions have not been adjusted to the local conditions, e.g. parameters for the data interface set incorrectly
- Device-related limits have not been considered, e.g. reading distance, aperture angle
- Selected trigger source for reading pulse incorrect

9.1.4 Malfunctions during operation

- Start/Stop operation: External reading pulse is missing, more than one object is in the reading area
- Device error (hardware/software)

9.2 Detailed malfunction analysis

9.2.1 LEDs on the bar code scanner

The following statuses can, among other things, be read from the LEDs on the bar code scanner's housing (see *chapter 4.7.2 LEDs on the bar code scanner's housing, page 38*):

- Reading reliability (Bar graph, diagnostic mode)
- Ready
- Status of the reading result (Result)
- Data trafic on the Host-, Aux- and CAN-interface

The LEDs can display possible malfunctions or errors. Please refer to the system information for further details.

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9.2.2 System information

The bar code scanner displays errors in various ways. The error output is hierarchised and always allows a detailed analysis:

- Communication errors can occur while transferring telegrams to the bar code scanner. In this case, the bar code scanner returns an error code.
- Error codes are written into a status protocol for errors which occur during a reading (see next chapter).

9.3 Status protocol

Important The status protocol remains even after switching the bar code scanner off and on again.

The bar code scanner differentiates between four error types:

- Information
- Warning
- Error
- Fatal error

The bar code scanner only saves the last five entries for each of the error types.

9.3.1 Displaying the status protocol using the SOPAS-ET configuration software

In order to display the status protocol, the SOPAS-ET configuration software has to be online and connected to the bar code scanner.

1. Connect the SOPAS-ET configuration software with the device.
2. Open the project tree CLV65x, SERVICE, SYSTEM STATUS, SYSTEM INFORMATION Register tab.

9.4 SICK Support

If an error cannot be eliminated, it is possible that the bar code scanner is defective. The bar code scanner cannot be repaired by the user, meaning that it is not possible to re-establish functions after a failure. However, the bar code scanner can be rapidly replaced by the user (see *chapter 8.5 Replacing a bar code scanner, page 78*).

➢ If an error occurs which cannot be eliminated, please contact SICK Service:

- International: Competent SICK branch office or SICK subsidiary
  - Tel. +49 211 5301-270
  - Fax. +49 211 5301-100
  - Email: info@sick.de
- Abroad: Your responsible SICK branch or SICK subsidiary
  - For telephone numbers and email addresses please see the back page of these operating instructions
  - For the postal address please visit **www.sick.com**.

➢ Only return devices after consultation with the SICK Service.

Important **Repairs to the bar code scanner should only be carried out by qualified and authorised SICK AG service staff.**

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10 Technical data

10.1 Datasheet of CLV65x (line scanner)

Type	Bar code scanner CLV65x
Focus	Autofocus
Reading window	Line scanner: With front/side reading window (with angle attachment: light entrance/exit under 105°)
Laser diode (wavelength)	Red light (λ = 658 nm)
MTTF of the laser diode	20,000 h
Device laser class	Class 2 in accordance with IEC 60825-1 and EN 60825-1, see warning sign on device for date of publication
Useable aperture angle	Max. 50° (front reading window and side reading window)
Scan/decoder frequency	600 ... 1,000 Hz
Resolution	0.25 ... 1.0 mm (9.84 ... 39.4 mil) (determined by distance)
Bar code print contrast (PCS)	≥ 60 %
Ambient light compatibility	2,000 lx (on bar code)
Number of bar codes per scan	1 ... 20 standard decoder; 1 ... 6 SMART decoder
Number of bar codes per reading gate[1)]	1 ... 50 bar codes (auto-discriminating)
Bar code types	Code 39, Code 128, Code 93, Codabar, EAN, EAN 128, UPC, 2/5 Interleaved, Pharmacode
Bar code lengths	Max. 50 characters (max. 5,000 characters across all bar codes per reading gate, 500 characters with multiplexer function (CAN))
Print ratio	2:1 ... 3:1
Number of multireads	1 ... 99
Memory card for parameters (cloning)	Micro SD card (flash card) 512 MB, optional
Optical indicators	6 LEDs: Ready, Result, Laser, Data, CAN, LNK TX and bargraph display
Acoustic display	Beeper, can be switched off, with function for result status display
Control elements	2 buttons (selecting and starting/stopping functions)
Reading pulsing	Pulse sources for start: Switching inputs "Sensor 1"[2)] and/or "Sensor 2"; command; Automatic Cycle; CAN Pulse sources for stop: Reading pulse source, "Sensor 1", "Sensor 2", command, timer, good read, condition
"Host" data interface	Serial: RS-232 or RS-422/485; Ethernet (port 2112), adjustable data format (serial) and data output format
Data transfer rate	2.4 ... 115.2 kbd
Protocols	SICK standard (SOPAS-Cola-A)
Physical configurations	Stand-alone
"Aux" data interface	Serial: RS-232 (57.6 kbd; 8 data bits, no parity, 1 stop bit); Ethernet (port 2111); fixed data output format
"Ethernet" data interface	Only for Ethernet version: 10/100 MBit/s, TCP/IP, half/full duplex
"CAN" data interface	20 kBit/s ... 1 MBit/s, SICK CAN-SENSOR network (Master, Slave, Multiplexer), CANopen
Digital switching inputs	Standard version: 2 ("Sensor 1", "Sensor 2"), 2 additional inputs via CMC600 in CDB620 Ethernet version: 1 ("Sensor 1"), 2 additional inputs via CMC600 in CDB620, optodecoupled, V_{in} = max. 32 V, reverse polarity protected, can be wired with PNP output, configurable debouncing 0 ... 10,000 ms

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Type	Bar code scanner CLV65x
Digital switching outputs	Standard version: 2 ("Result 1", "Result 2"), 2 additional outputs via CMC600 in CDB620 Ethernet version: no output, 2 outputs via CMC600 in CDB620 PNP, I_{out} = max. 100 mA, short circuit-proof, configurable impulse duration (static, 10 ... 1,000 ms)
Electrical connection	Standard version: Cable (0.9 m (3 ft)) with 15-pole D-Sub-HD plug Ethernet version: Revolving connector unit with two M12 circular connectors (12-pole plug, 4-pole socket)
Operating voltage [3]	18 ... 30 V DC in accordance with IEC 60364-4-41 (SELV respectively PELV acc. to IEC 60364-4-41 (2005))
Power consumption	Line scanner: typically 8.5 W with 18 ... 30 V DC
Housing	Die-cast aluminium
Reading window material	Glass or plastic, see type plate CLV65x-xxxy (y = 0: glass, y = 1: plastic)
Electrical safety	According to EN 60950-1 (2006-04)
Enclosure rating	III, according to EN 61140 (2002-03)
Enclosure rating	IP 65, according to EN 60529 (1991-10); A1 (2002-02)
EMV tested	Emission: according to EN 61000-6-3 (2007-01); immunity: according to EN 61000-6-2 (2005-08)
Vibration-/ shock-test	According to EN 60068-2-6 (1995)/ to EN 60068-2-27 (1993)
Weight	Standard version: 320 g (11.3 oz) with connection cable (front reading window), 340 g (12.0 oz) (side reading window) Ethernet version: 250 g (8.8 oz) without connection cables (front reading window), 270 g (9.5 oz) (side reading window)
Ambient operating temperature/ storage temperature	0 ... +40 °C (32 ...104 °F)/–20 ... +70 °C (-4 ... 158 °F)
Max. rel. humidity	90 %, non condensing
Housing colour	Light blue (according to RAL 5012)

[1] Reading gate: code evaluation time window created internally by the reading pulse

[2] Ethernet version: only switching input "Sensor 1"

[3] The bar code scanner CLV65x is certified according to UL60950-1 with the following requirements:
- Power supply by LPS or Class-2 power supply unit
- Use SICK connection cables (category AVL V2 according to UL 758) with a length of up to 3 m (9.84 ft)

The certification applies for devices with appropriate marking on the type plate. The enclosure rating (IP) is not UL certified.

Tab. 10-1: Technical specifications of the bar code scanner CLV65x (line scanner)

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10.2 Data sheet for the CLV65x bar code scanner (line scanner with oscillating mirror)

The technical specifications correspond to those of the CLV65x bar code scanner (line scanner), except for the following variations:

Type	Bar code scanner CLV65x
Reading window	Side reading window, light exit under 105° (default setting)
Useable aperture angle	Max. 50°
Oscillating mirror functions	Uncontrolled operation: • Fixed (position can be adjusted) or • Continuous, free oscillation Controlled operation (start/stop condition can be adjusted): • Triggered oscillation (start position and number of oscillations can be adjusted) • One-shot: One-time oscillation in forward and return motion (start position can be adjusted) In every oscillation mode, the amplitude can be adjusted separately for each of the two deflection directions. The deflection speed ratio of one deflection direction to the other can be adjusted within the selected periodic time for a complete oscillation sequence.
Oscillation frequency / Periodic time	0.5 ... 6.25 Hz/2,000 ... 160 ms
Max. angle of deflection (amplitude)	+20° ... –20°
Power consumption	Typically 9.5 W with 18 ... 30 V DC
Weight	Standard version: 420 g (14.8 oz) Ethernet version: 350 g (12.3 oz)

Tab. 10-2: Technical specifications for the CLV65x bar code scanner (line scanner with oscillating mirror)

10.3 Addition to UL certification

Type	Supply voltage	Power consumption	Power input	Ambient operating temperature
CLV650-0xxx	18 ... 30 V DC ⎓	8.5 W	Max. 800 mA	0 ... +40 °C (32 ... 104 °F)
CLV650-6xxx	18 ... 30 V DC ⎓	9.5 W	Max. 800 mA	0 ... +40 °C (32 ... 104 °F)
CLV651-0xxx	18 ... 30 V DC ⎓	8.5 W	Max. 800 mA	0 ... +40 °C (32 ... 104 °F)
CLV651-6xxx	18 ... 30 V DC ⎓	9.5 W	Max. 800 mA	0 ... +40 °C (32 ... 104 °F)

Tab. 10-3: Technical specifications for UL certification: bar code scanner with connection cable from 0.9 m (1 ft) up to 6 m (19.7 ft)

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10.4 Specification diagrams

Test code	Code 39/ITF
Print ratio	2:1
Print contrast	>90 %
Tilt	±10°
Ambient light	< 2,000 lx
Good read rate	>75 %

Tab. 10-4: Reading conditions for all specification diagrams

Observing the reading area diagram (see figure) of the CLV65x of a module width at a focus position from the top, the selections ① , ② and ③ can be transferred to the depth of focus diagram for this module width as follows. Therefore, the depth of focus diagram consists of a slice-shaped sequence of many reading area diagrams along the focus position.

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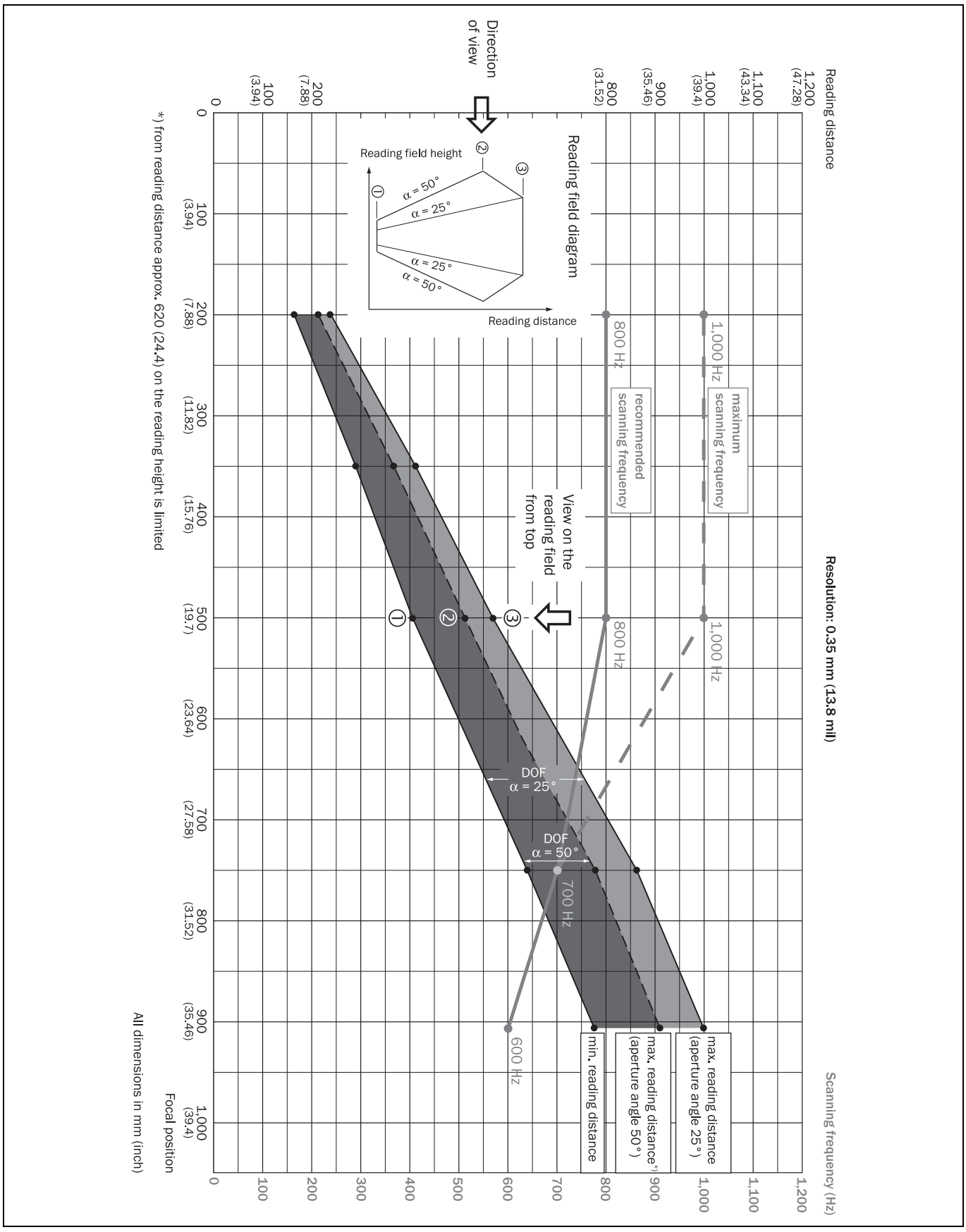

Fig. 10-1: Meaning of selection ① , ② and ③ in the reading area diagram related to depth of focus diagram.

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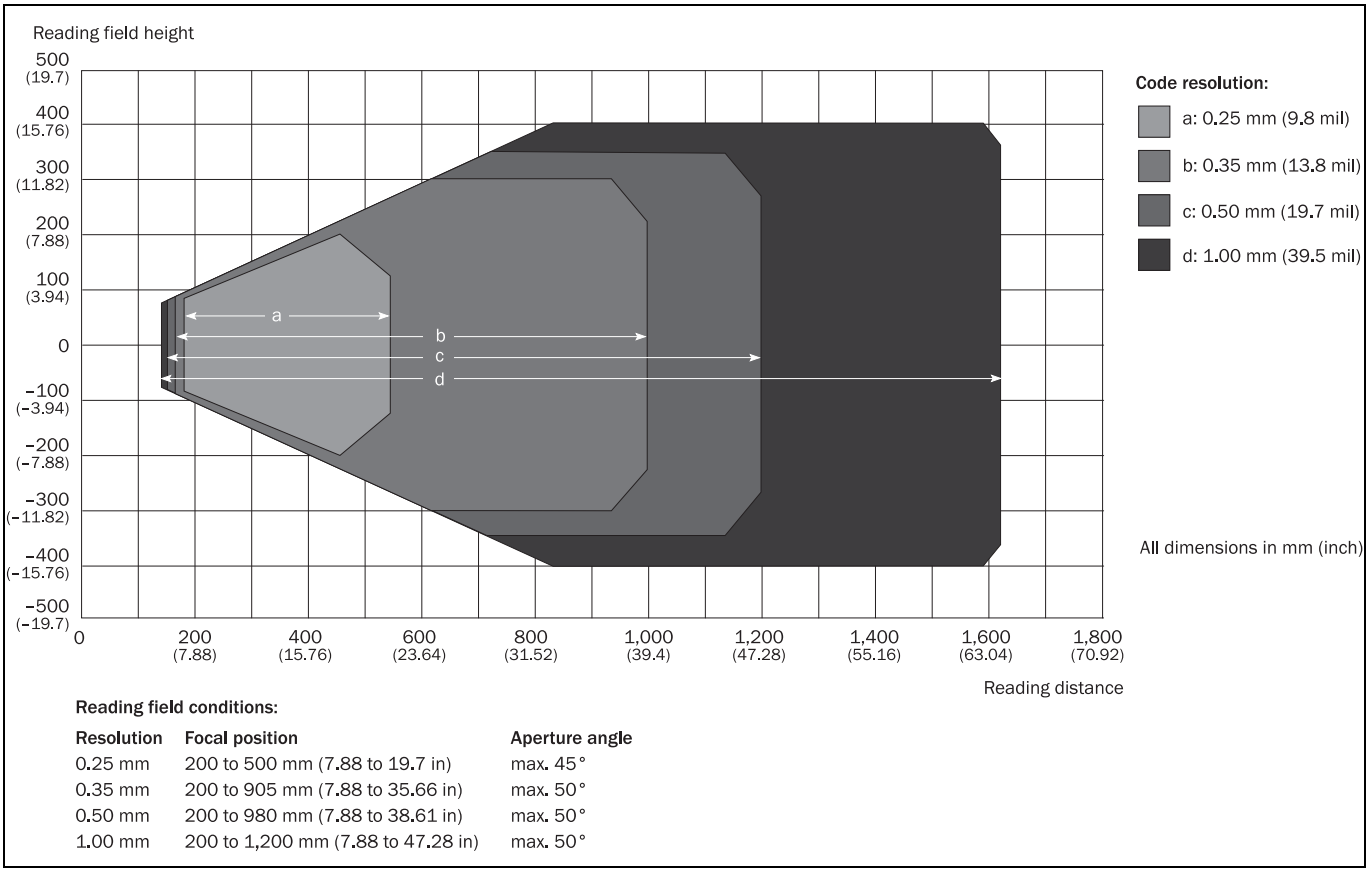
10.4.1 Depth of field ranges of the CLV650 line scanner with front reading window



Reading field conditions:

Resolution	Focal position	Aperture angle
0.25 mm	200 to 500 mm (7.88 to 19.7 in)	max. 45°
0.35 mm	200 to 905 mm (7.88 to 35.66 in)	max. 50°
0.50 mm	200 to 980 mm (7.88 to 38.61 in)	max. 50°
1.00 mm	200 to 1,200 mm (7.88 to 47.28 in)	max. 50°

Fig. 10-2: Depth of field ranges of the CLV650 line scanner with front reading window:
Resolutions 0.25 mm (9.8 mil), 0.35 mm (13.8 mil), 0.5 mm (19.7 mil) and 1.0 mm (39.4 mil)

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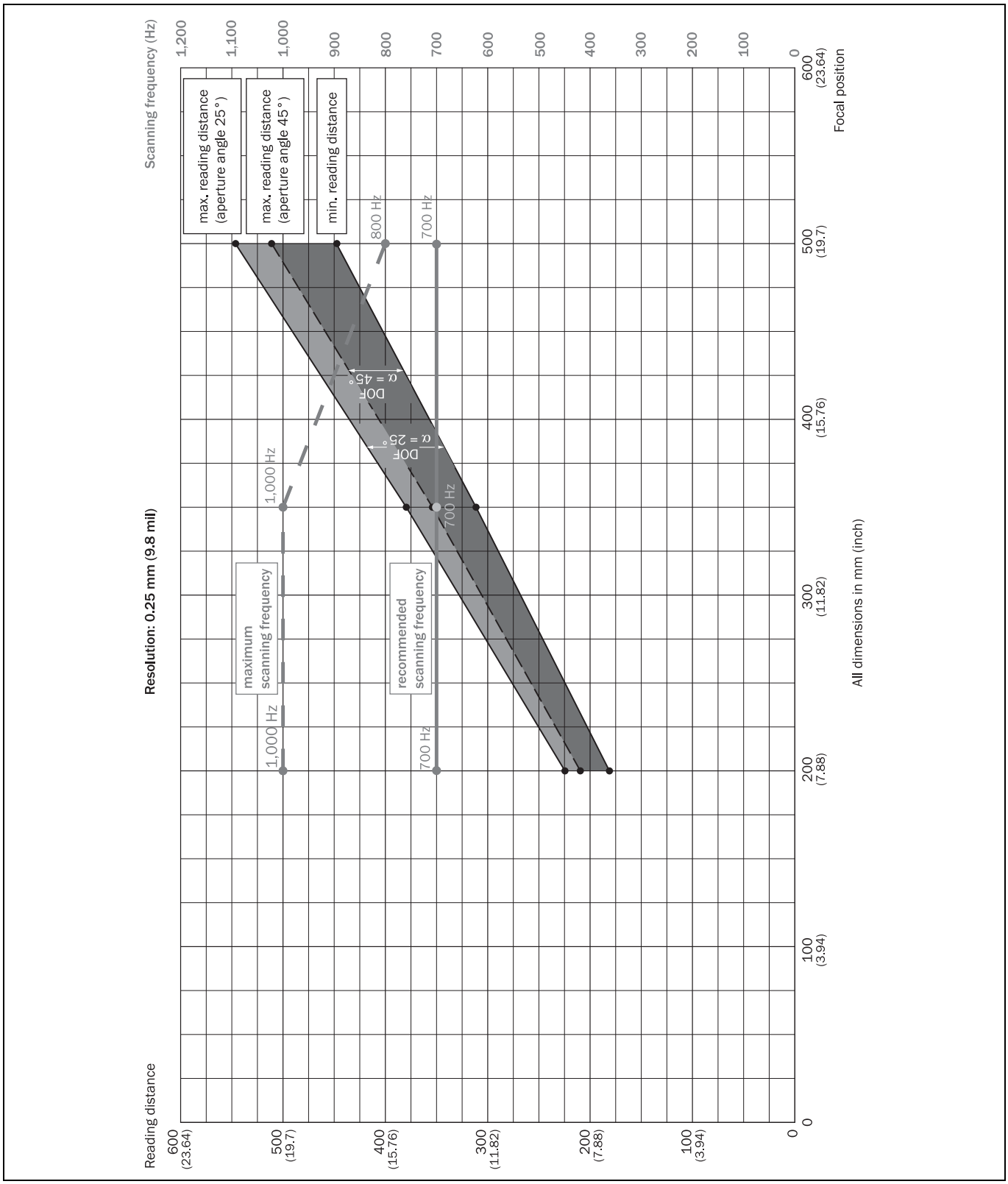

Fig. 10-3: Depth of field ranges of the CLV650 line scanner with front reading window: min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 0.25 mm (9.8 mil)

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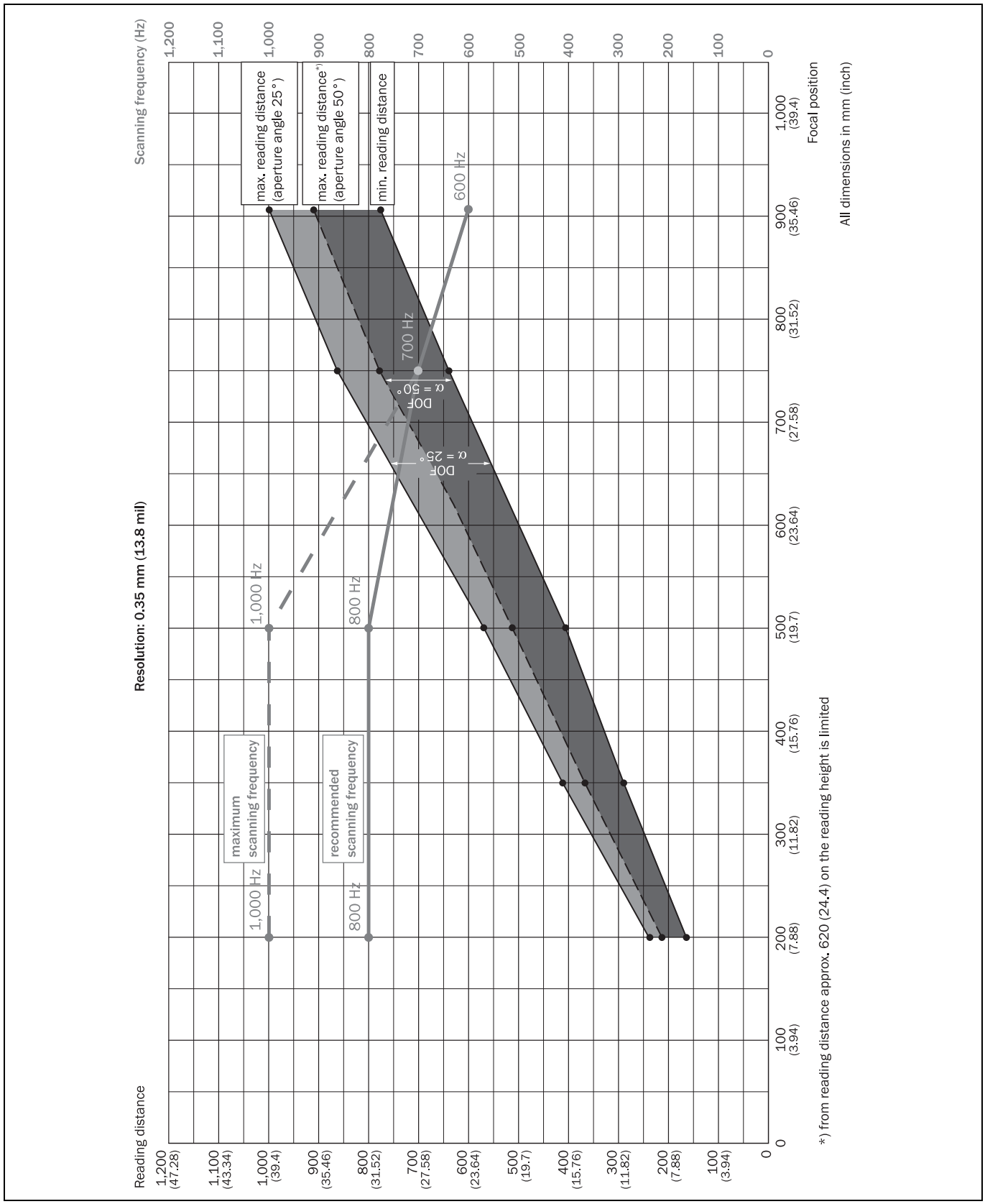

Fig. 10-4: Depth of field ranges of the CLV650 line scanner with front reading window: min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 0.35 mm (13.8 mil)

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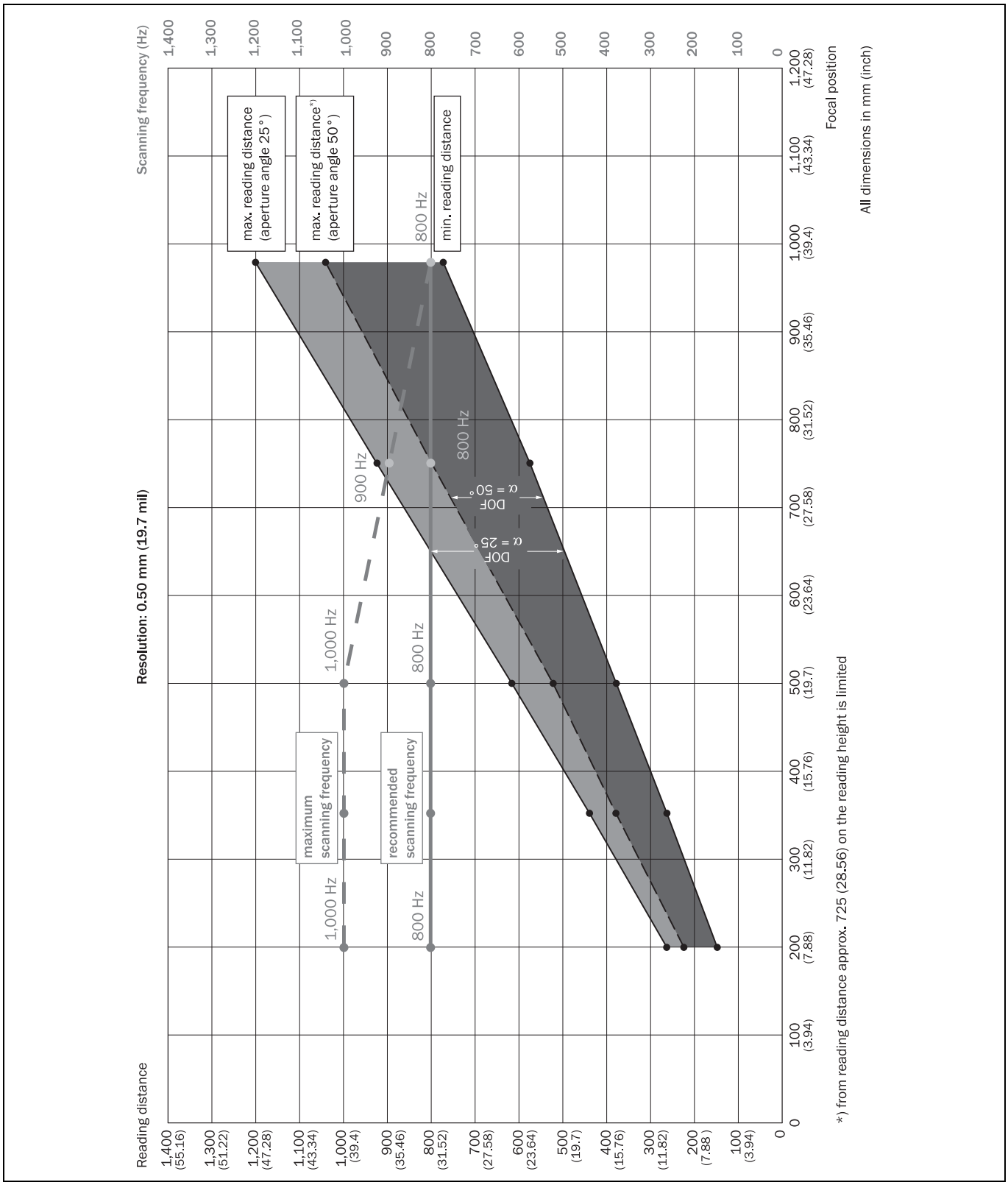
Scanning frequency (Hz)
Resolution: 0.50 mm (19.7 mil)
Reading distance
Focal position
All dimensions in mm (inch)
max. reading distance (aperture angle 25 °)
max. reading distance*) (aperture angle 50 °)
min. reading distance
maximum scanning frequency
recommended scanning frequency
1,000 Hz
800 Hz
900 Hz
DOF
α = 50 °
α = 25 °
*) from reading distance approx. 725 (28.56) on the reading height is limited

Fig. 10-5: Depth of field ranges of the CLV650 line scanner with front reading window: min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 0.5 mm (19.7 mil)

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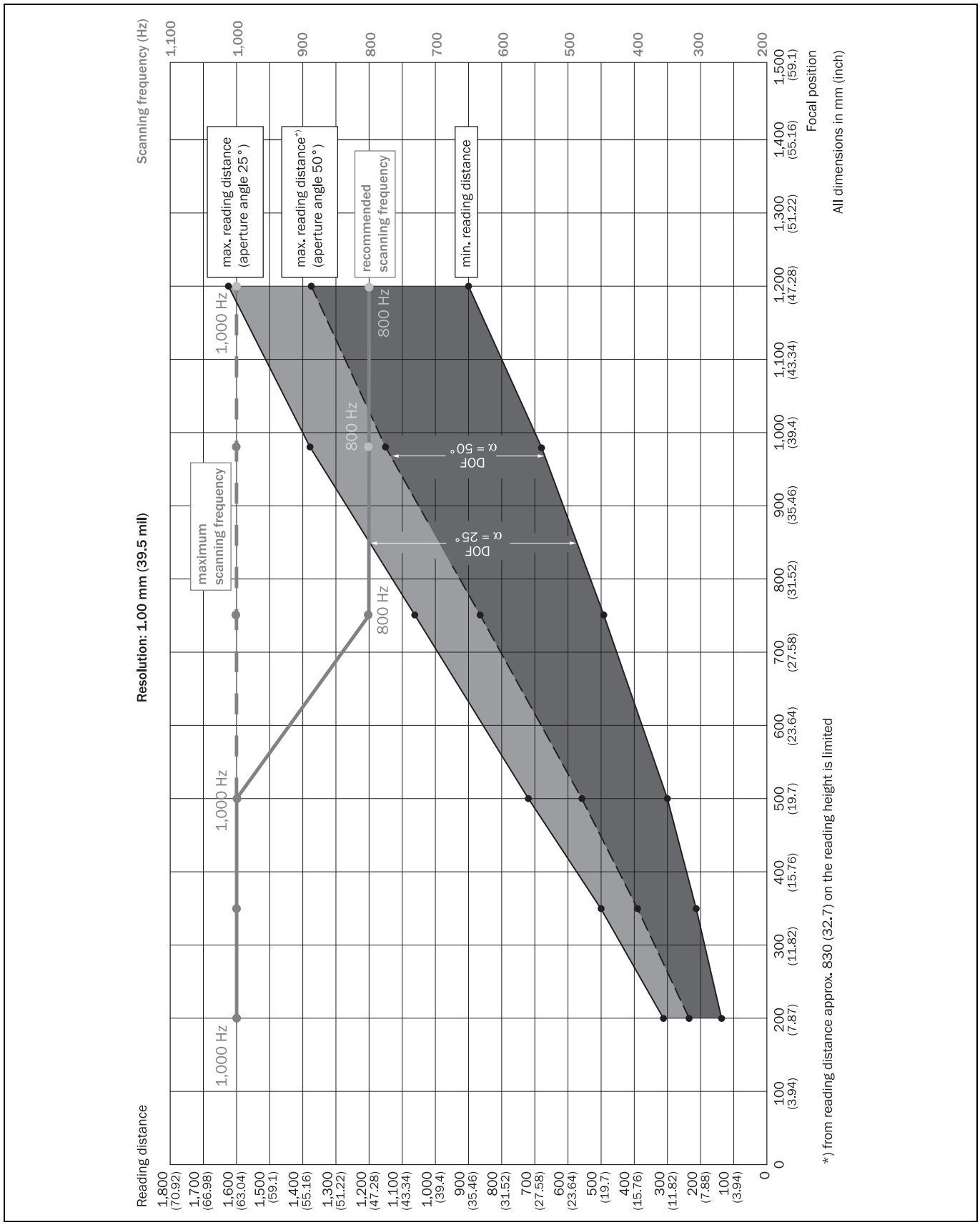
Scanning frequency (Hz)
Resolution: 1.00 mm (39.5 mil)
Reading distance
Focal position
All dimensions in mm (inch)
max. reading distance (aperture angle 25 °)
max. reading distance*) (aperture angle 50 °)
recommended scanning frequency
min. reading distance
maximum scanning frequency
1,000 Hz
800 Hz
DOF α = 50°
DOF α = 25°
*) from reading distance approx. 830 (32.7) on the reading height is limited

Fig. 10-6: Depth of field ranges of the CLV650 line scanner with front reading window: min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 1.0 mm (39.4 mil)

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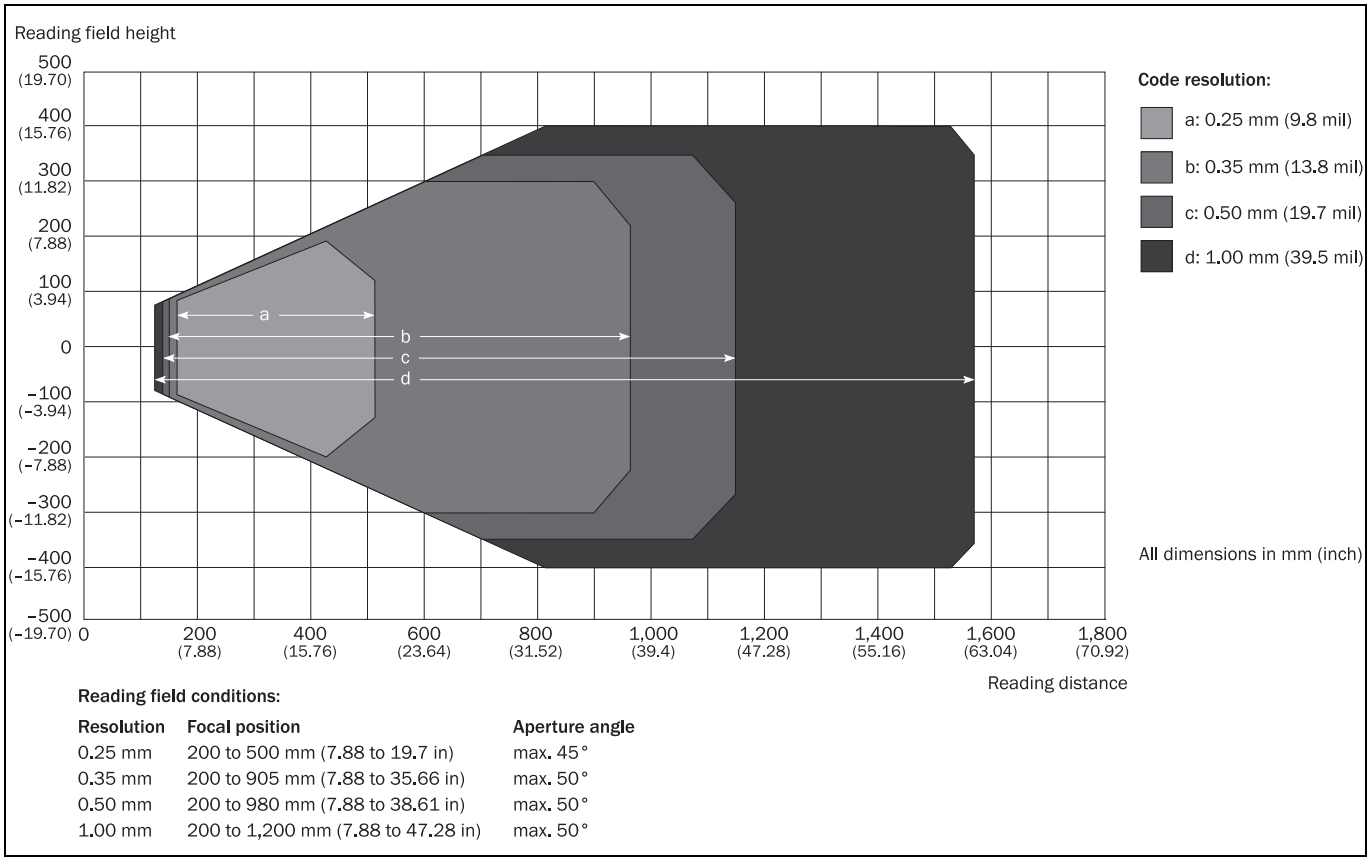
10.4.2 Depth of field ranges of the CLV650 line scanner with oscillating mirror (side reading window)



Reading field conditions:

Resolution	Focal position	Aperture angle
0.25 mm	200 to 500 mm (7.88 to 19.7 in)	max. 45°
0.35 mm	200 to 905 mm (7.88 to 35.66 in)	max. 50°
0.50 mm	200 to 980 mm (7.88 to 38.61 in)	max. 50°
1.00 mm	200 to 1,200 mm (7.88 to 47.28 in)	max. 50°

Fig. 10-7: Depth of field ranges of the CLV650 line scanner with oscillating mirror (side reading window): Resolutions 0.25 mm (9.8 mil), 0.35 mm (13.8 mil), 0.5 mm (19.7 mil) and 1.0 mm (39.4 mil)

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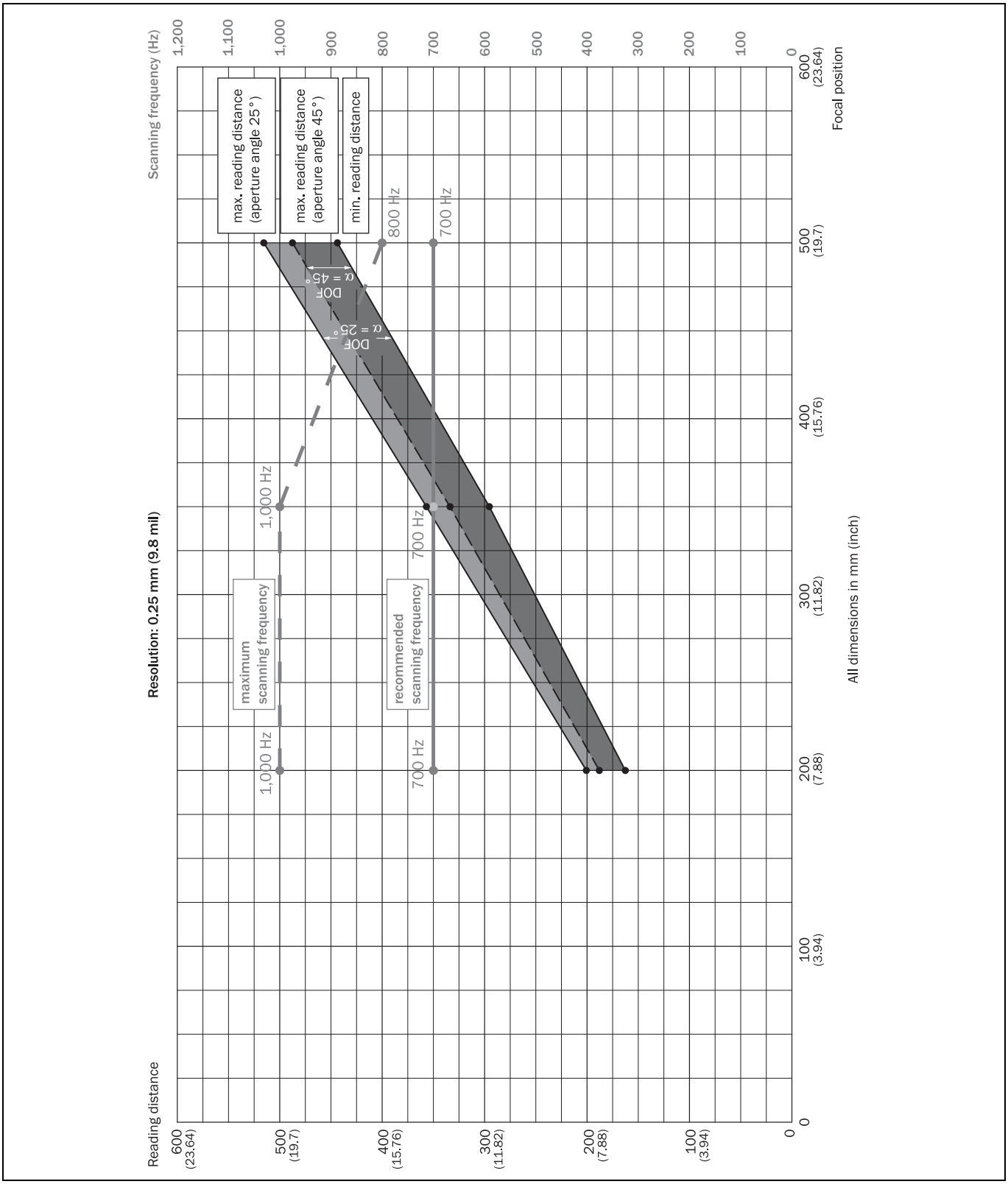

Fig. 10-8: Depth of field ranges of the CLV650 line scanner with oscillating mirror (side reading window): min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 0.25 mm (9.8 mil)

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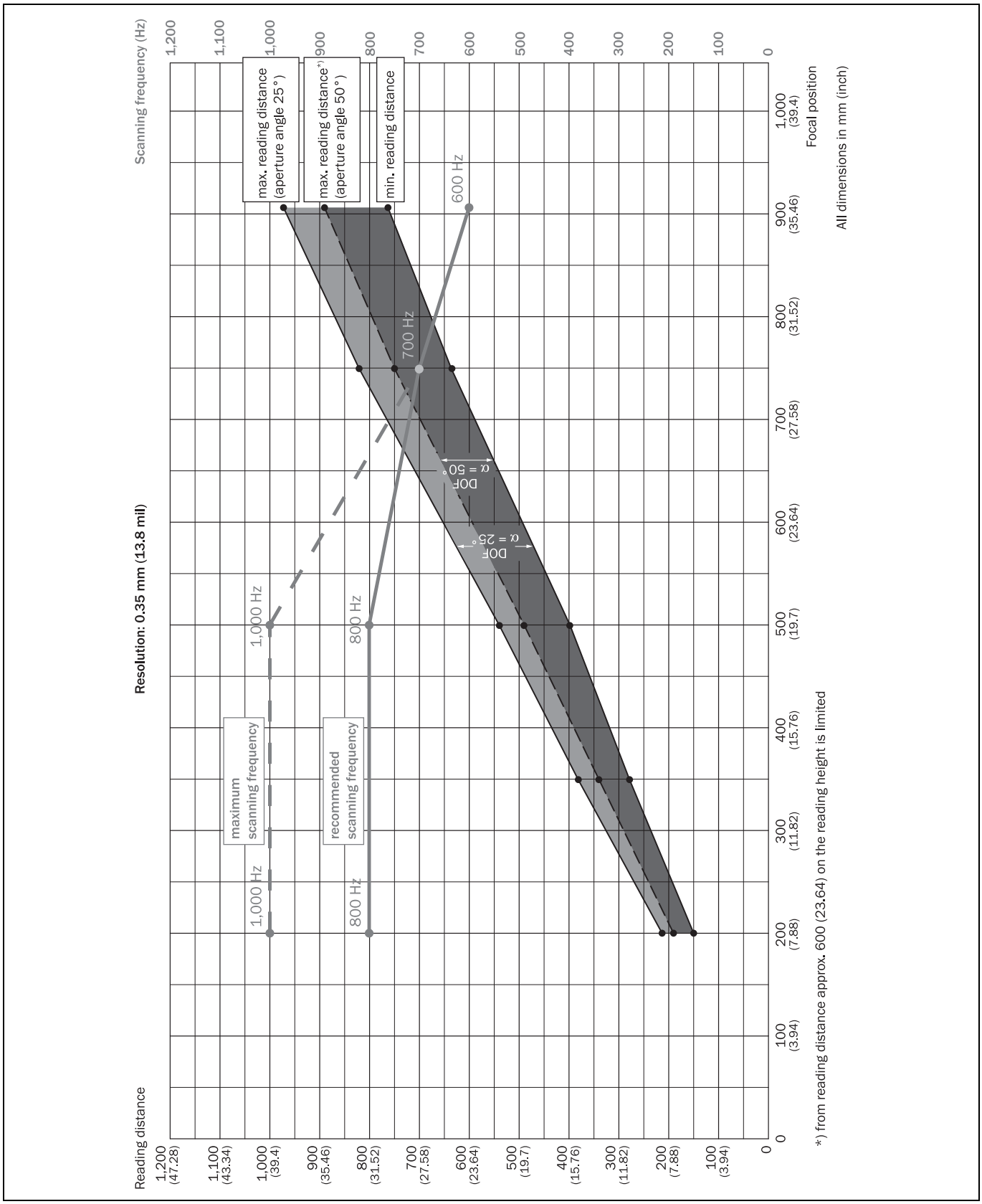

Fig. 10-9: Depth of field ranges of the CLV650 line scanner with oscillating mirror (side reading window): min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 0.35 mm (13.8 mil)

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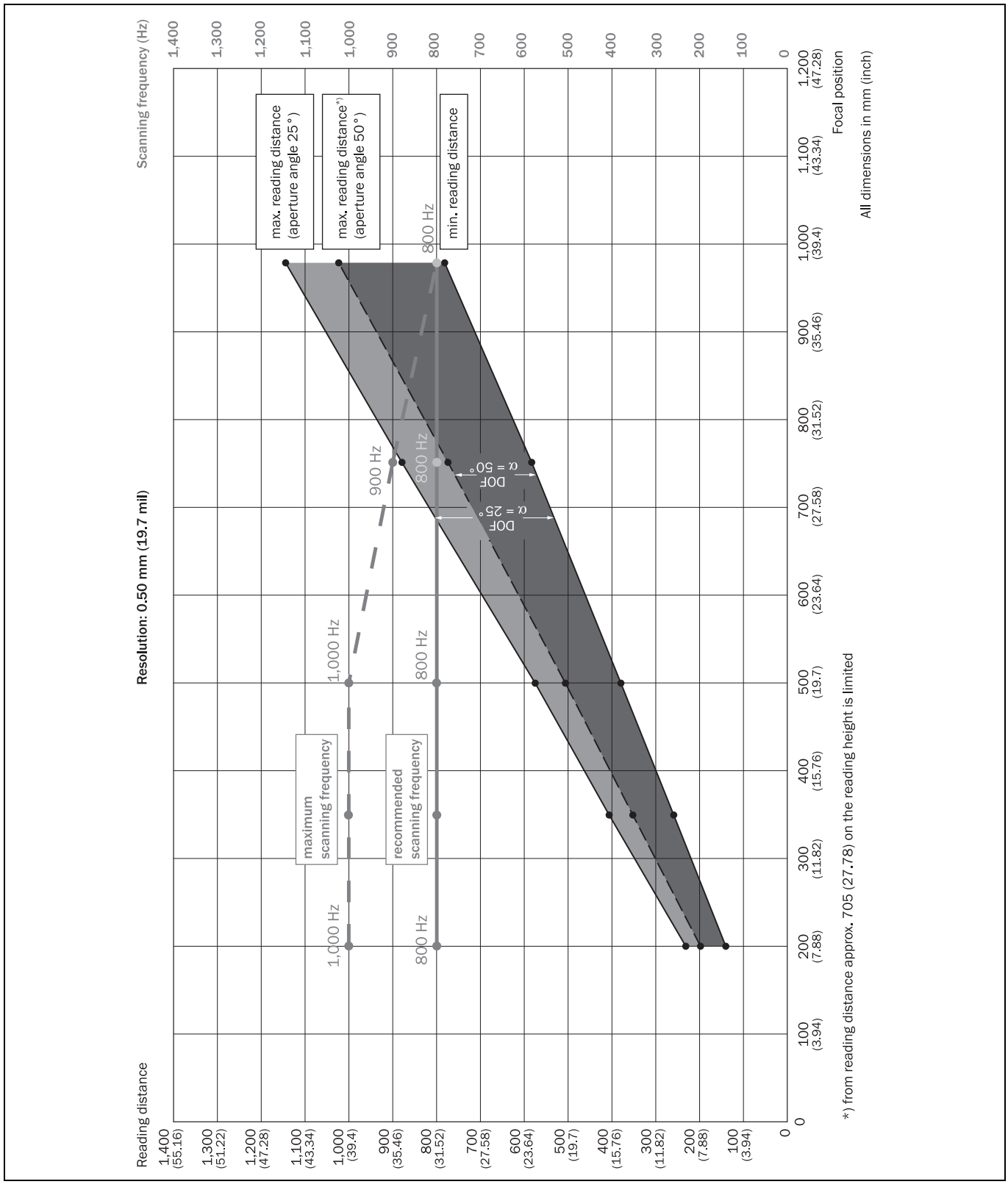

Fig. 10-10: Depth of field ranges of the CLV650 line scanner with oscillating mirror (side reading window): min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 0.5 mm (19.7 mil)

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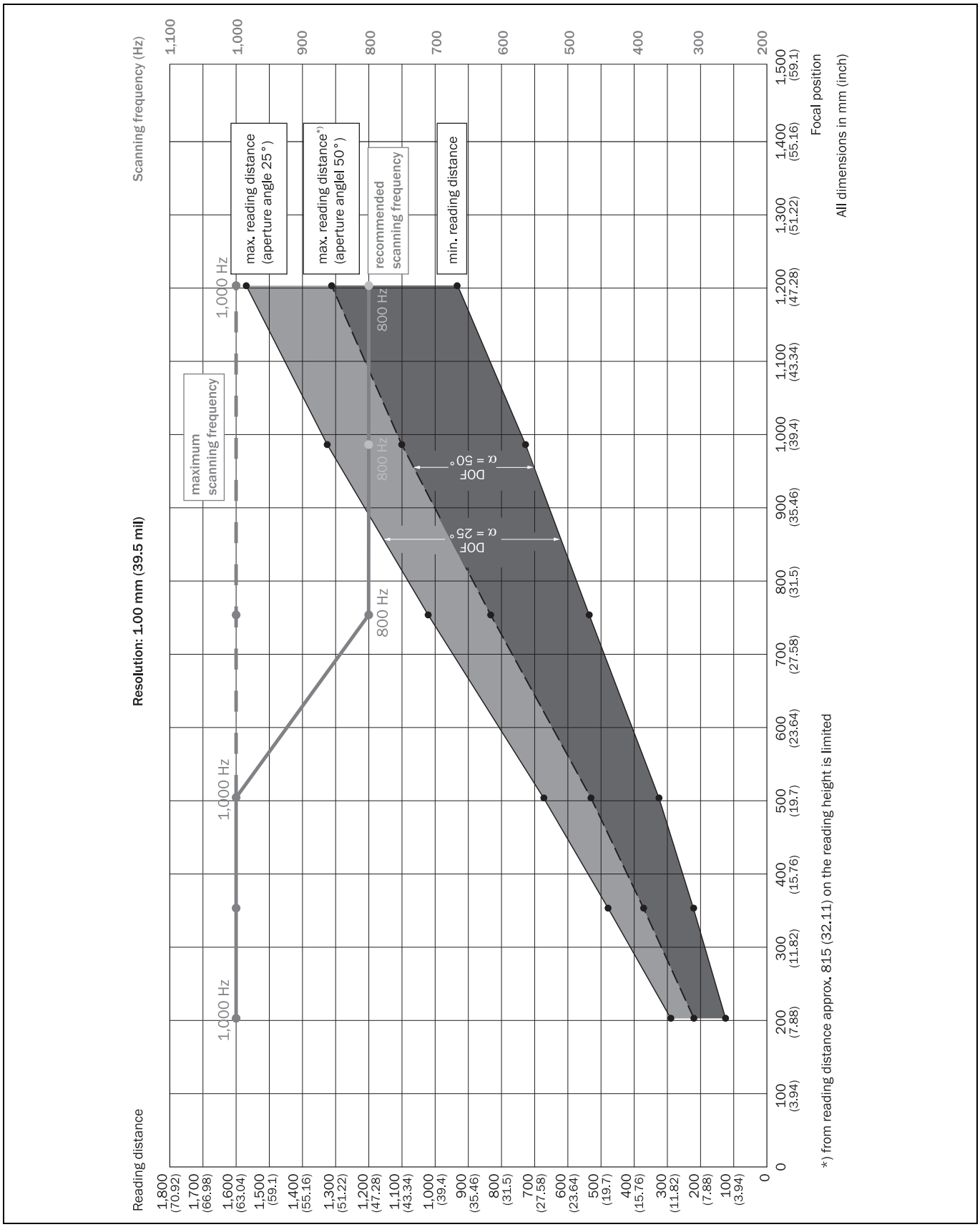
Resolution: 1.00 mm (39.5 mil)
Scanning frequency (Hz)
Reading distance
Focal position
All dimensions in mm (inch)
max. reading distance (aperture angle 25 °)
max. reading distance*) (aperture angle 50 °)
recommended scanning frequency
min. reading distance
maximum scanning frequency
1,000 Hz
800 Hz
DOF α = 50°
DOF α = 25°
*) from reading distance approx. 815 (32.11) on the reading height is limited

Fig. 10-11: Depth of field ranges of the CLV650 line scanner with oscillating mirror (side reading window): min. und max. reading distance depending on the focus position and the aperture angle with a resolution of 1.0 mm (39.4 mil)

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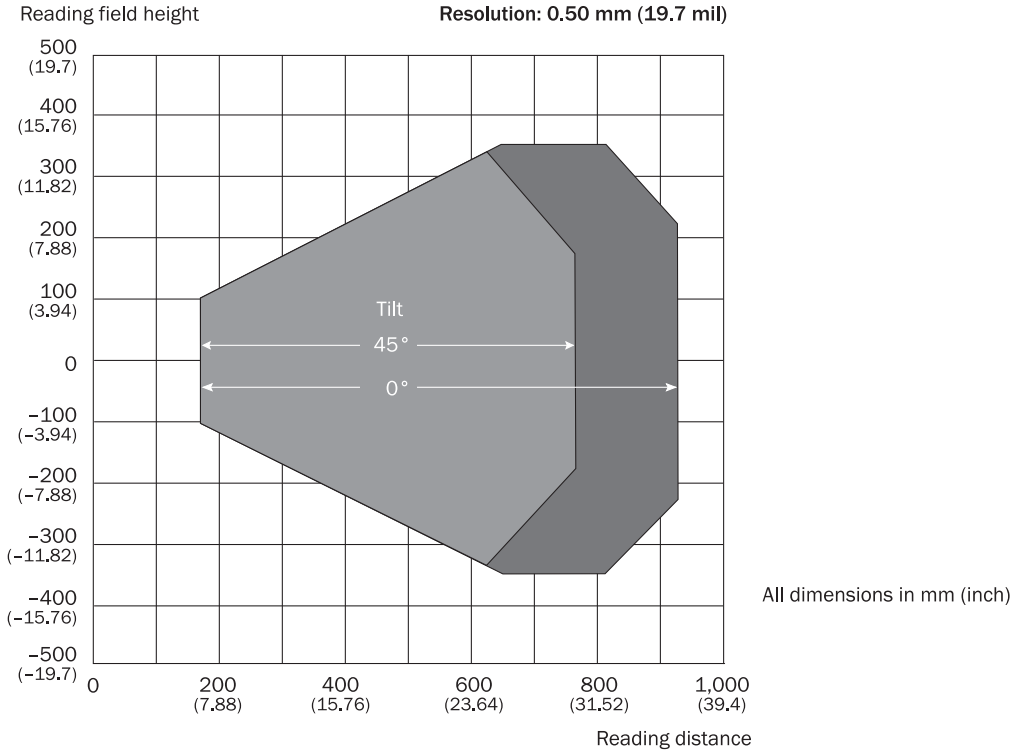
10.4.3 Depth of field ranges of the CLV651 line scanner with front reading window (different aperture and inclination angle)



Reading field conditions:

Resolution	Focal position	Aperture angle
0.50 mm	250 to 650 mm (9.85 to 25.61 in)	max. 55°

Fig. 10-12: Depth of field ranges of the CLV651 line scanner with front reading window: Resolution 0.5 mm (19.7 mil) and inclination angle 0°/45°

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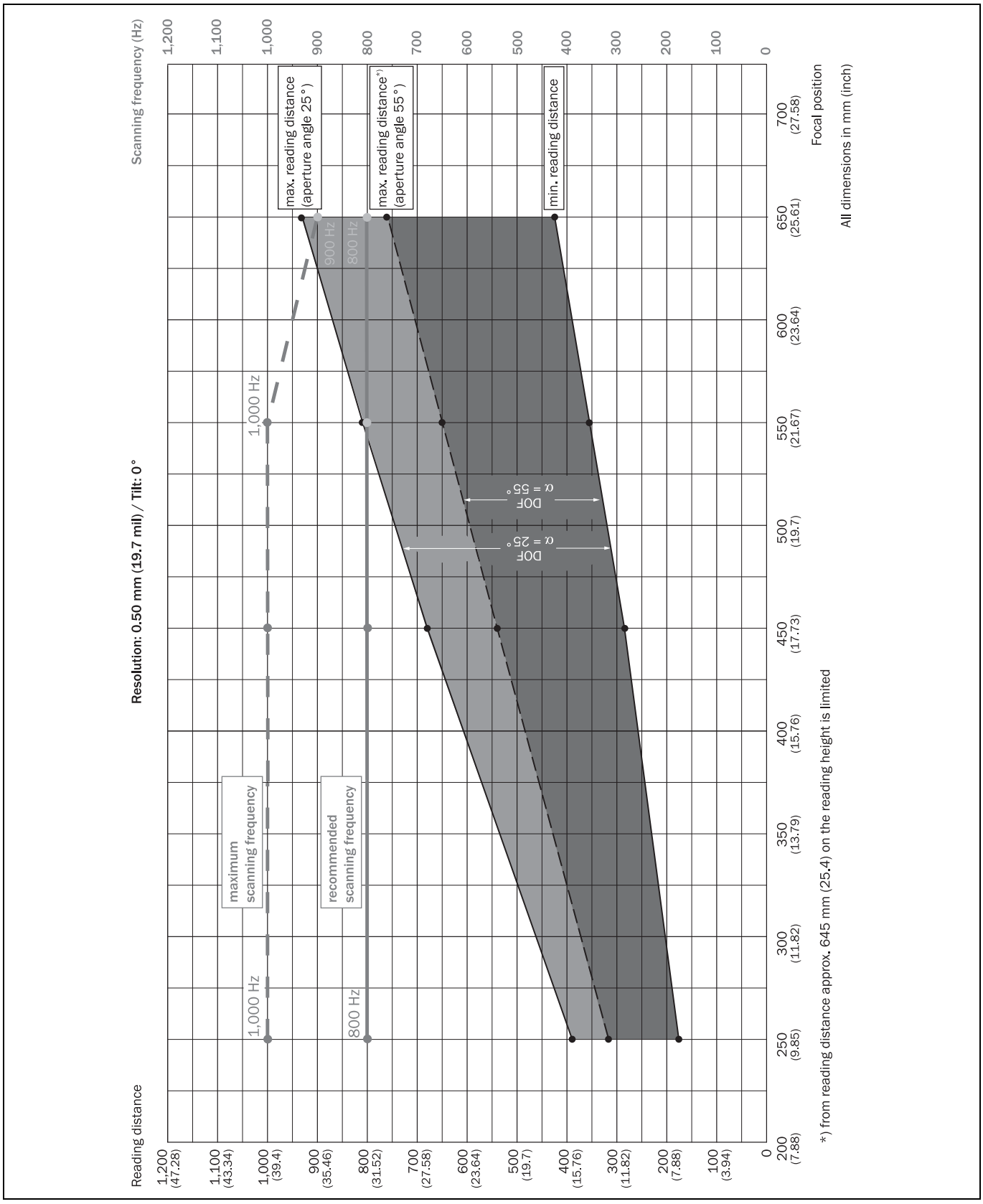
Resolution: 0.50 mm (19.7 mil) / Tilt: 0 °
Scanning frequency (Hz)
Reading distance
Focal position
All dimensions in mm (inch)
max. reading distance (aperture angle 25 °)
max. reading distance*) (aperture angle 55 °)
min. reading distance
maximum scanning frequency
recommended scanning frequency
1,000 Hz
800 Hz
DOF α = 25 °
DOF α = 55 °
*) from reading distance approx. 645 mm (25.4) on the reading height is limited

Fig. 10-13: Depth of field ranges of the CLV651 line scanner with front reading window: Resolution 0.5 mm (19.7 mil); inclination angle 0°; aperture angle 25°/55°

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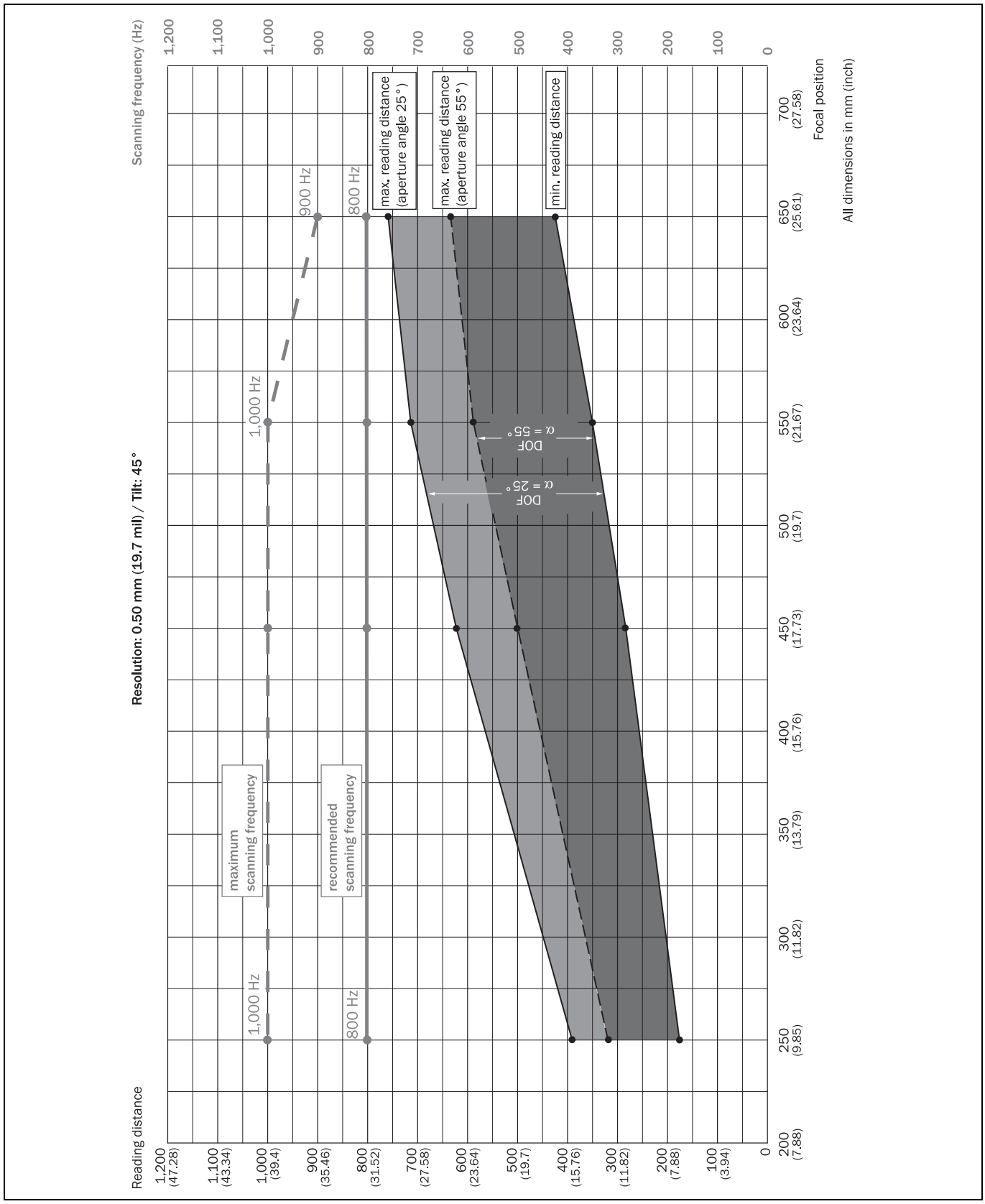

Fig. 10-14: Depth of field ranges of the CLV651 line scanner with front reading window: Resolution 0.5 mm (19.7 mil); inclination angle 45°; aperture angle 25°/55°

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10.4.4 Depth of field ranges of the CLV651 line scanner with oscillating mirror (different aperture and inclination angle)

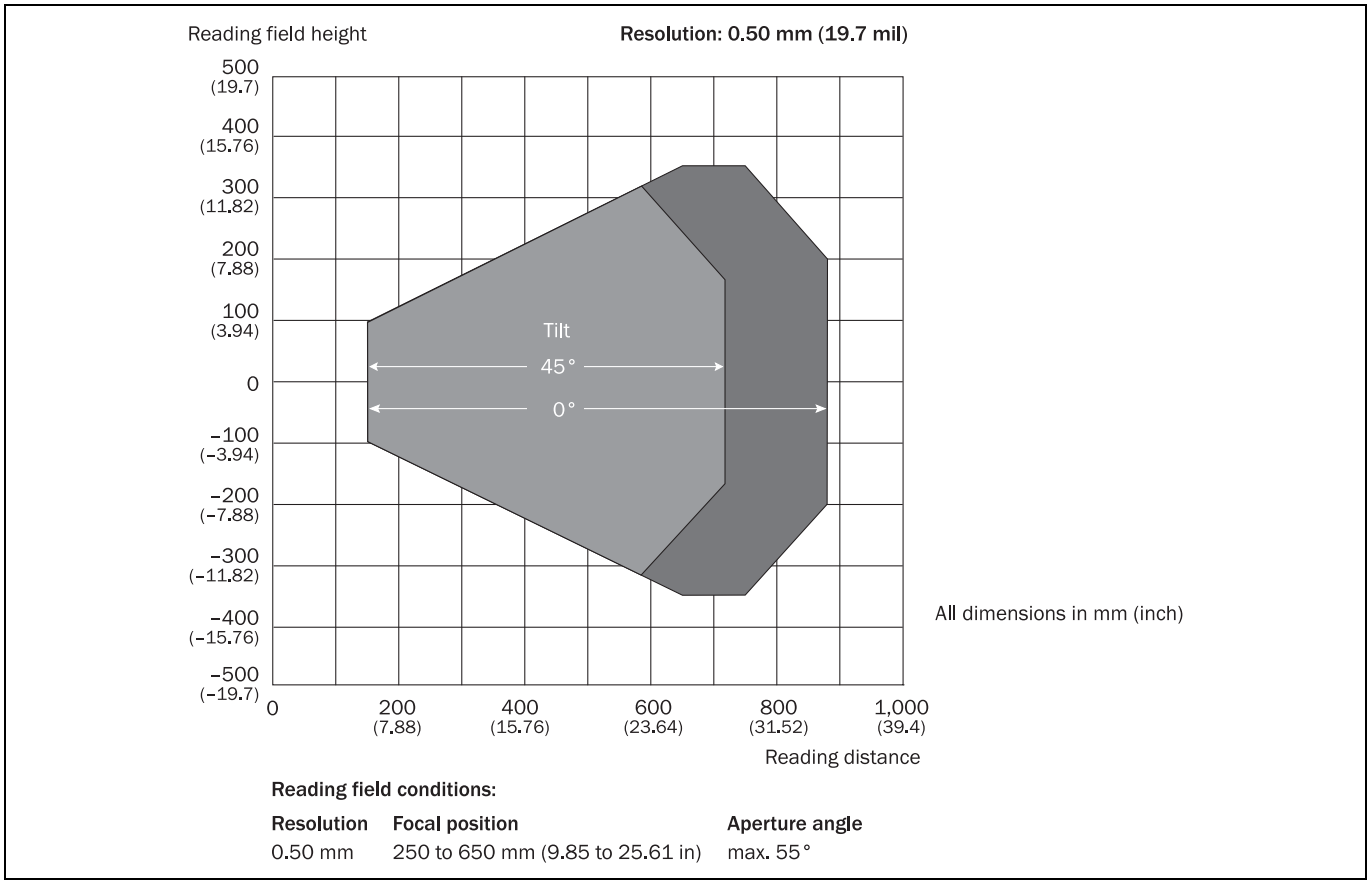

Fig. 10-15: Depth of field ranges of the CLV651 line scanner with oscillating mirror (side reading window): Resolution 0.5 mm (19.7 mil) and inclination angle 0°/45°

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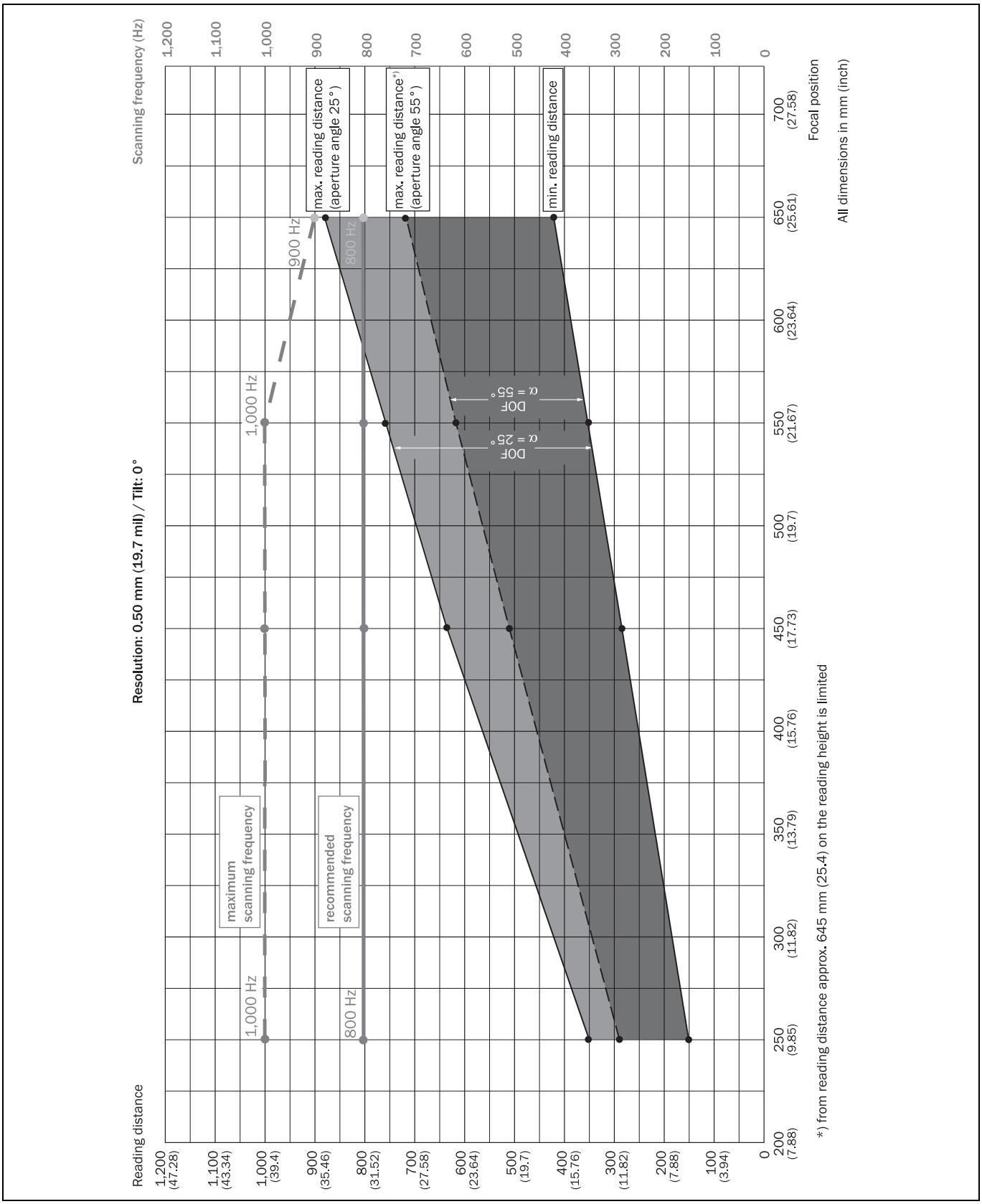
Resolution: 0.50 mm (19.7 mil) / Tilt: 0°
Scanning frequency (Hz)
Reading distance
Focal position
All dimensions in mm (inch)
max. reading distance (aperture angle 25°)
max. reading distance*) (aperture angle 55°)
min. reading distance
900 Hz
800 Hz
1,000 Hz
800 Hz
maximum scanning frequency
recommended scanning frequency
DOF α = 55°
DOF α = 25°
*) from reading distance approx. 645 mm (25.4) on the reading height is limited

Fig. 10-16: Depth of field ranges of the CLV651 line scanner with oscillating mirror (side reading window): Resolution 0.5 mm (19.7 mil); inclination angle 0°; aperture angle 25°/55°

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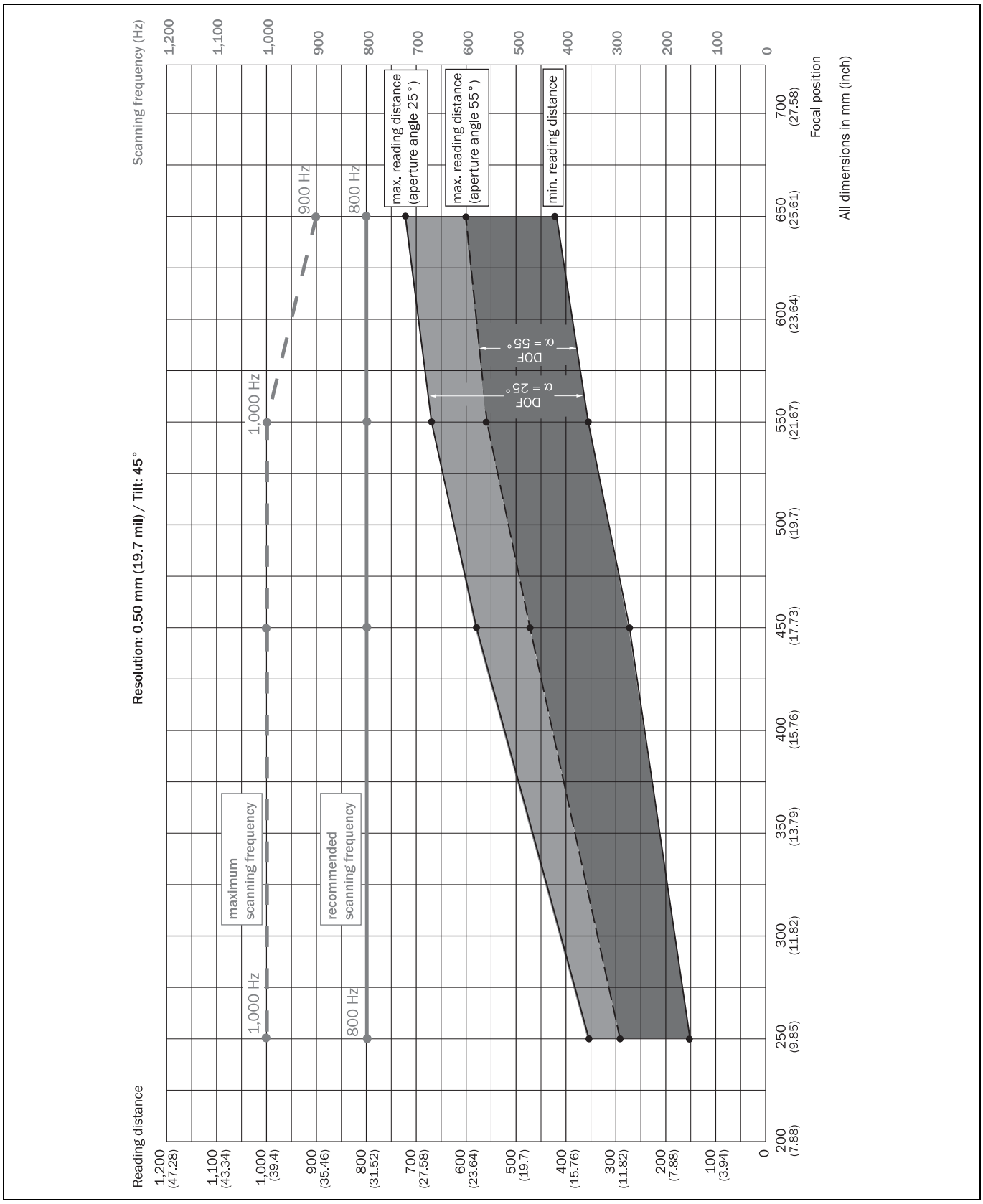

Fig. 10-17: Depth of field ranges of the CLV651 line scanner with oscillating mirror (side reading window): Resolution 0.5 mm (19.7 mil); inclination angle 45°; aperture angle 25°/55°

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10.4.5 Deflection range of line scanner with oscillating mirror

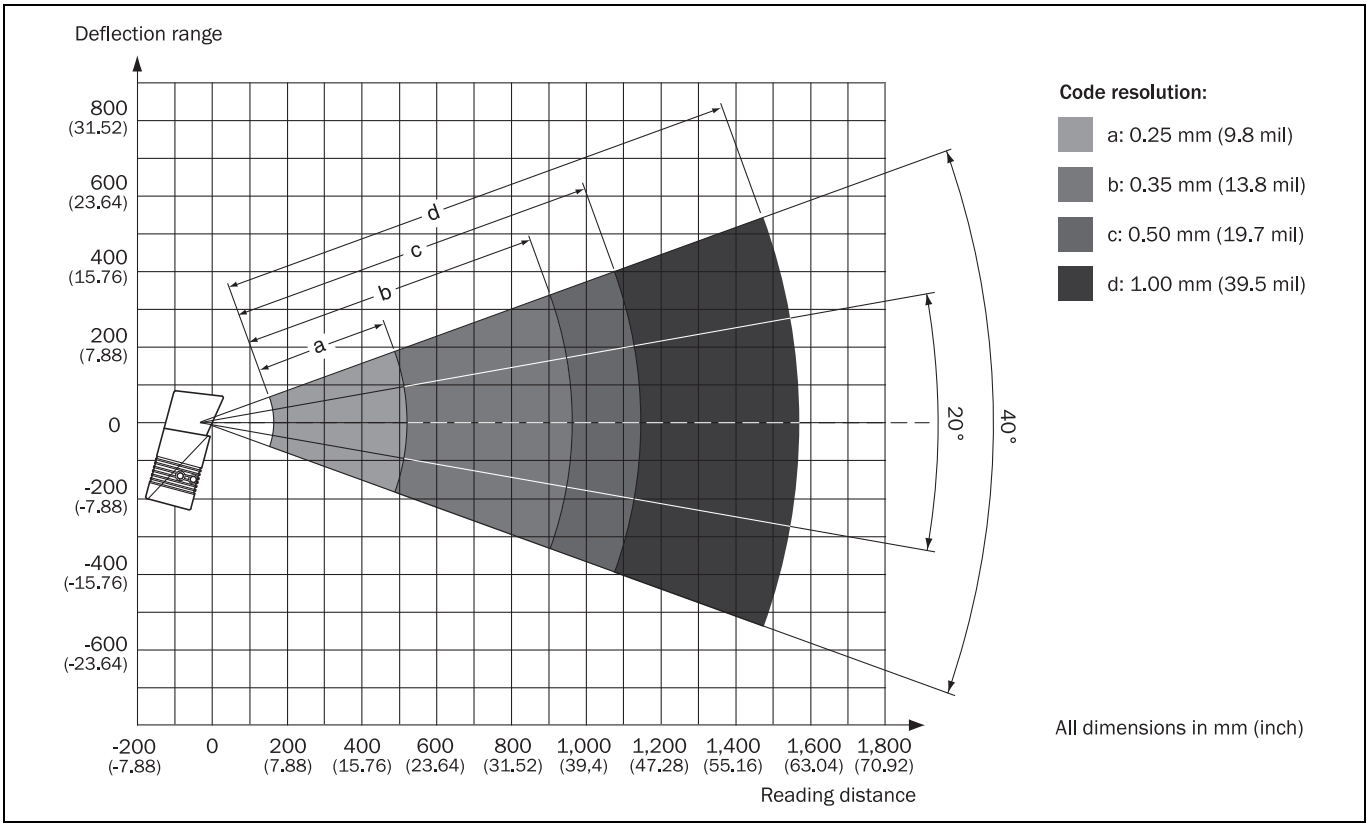

Fig. 10-18: CLV650: Deflection range as a function of the reading distance, deflection angle and resolution

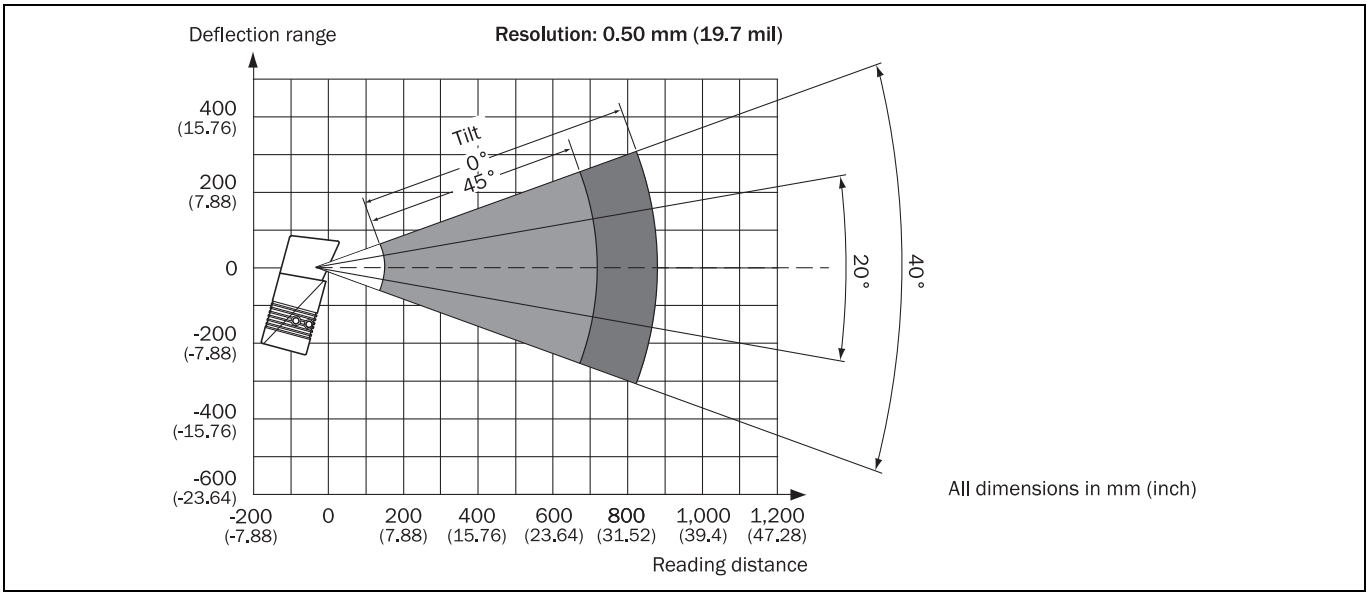

Fig. 10-19: CLV651: Deflection range as a function of the reading distance, deflection angle and resolution of 0.5 mm (19.7 mil)

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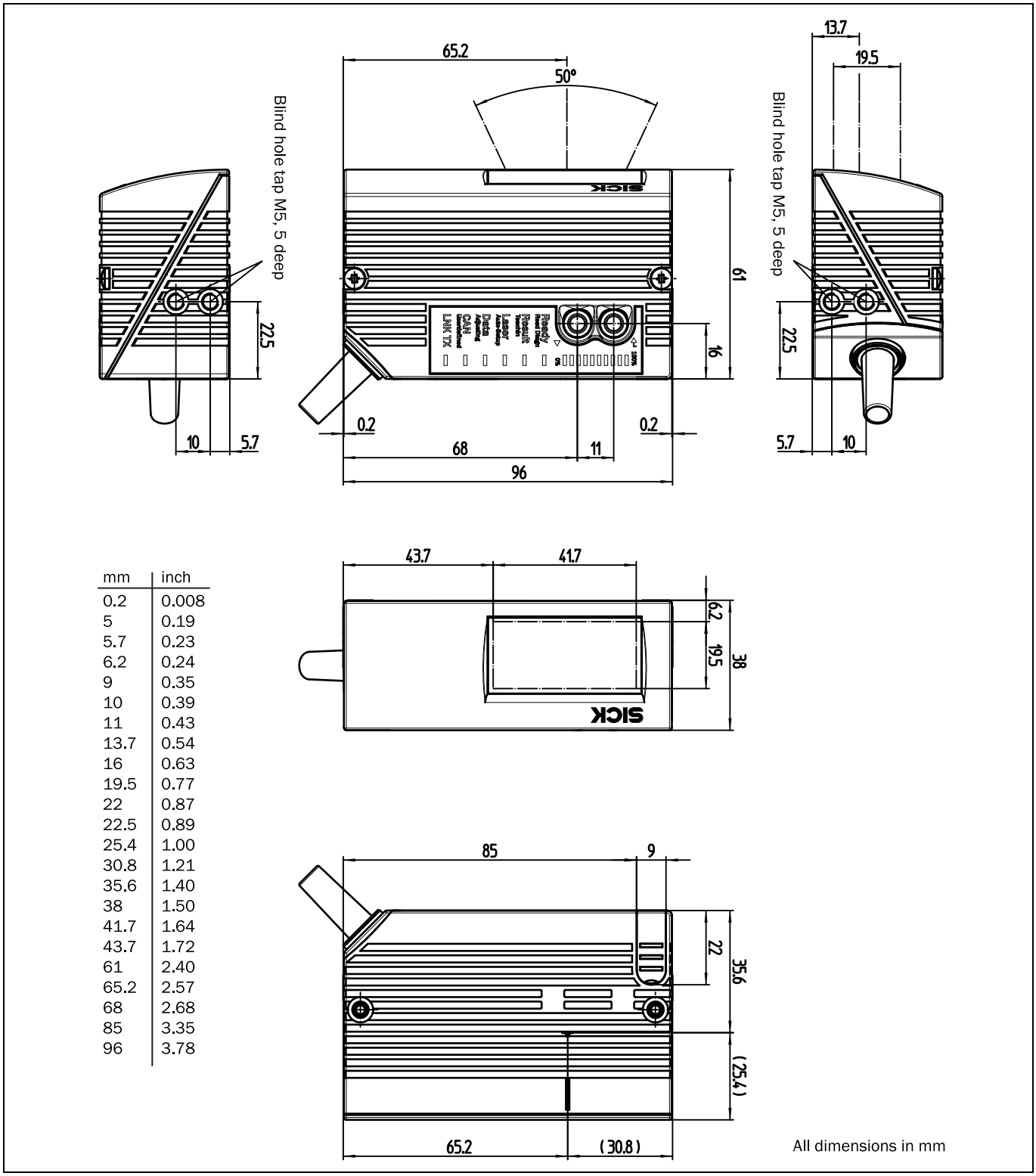
10.5 CLV65x bar code scanner diminsional drawings

10.5.1 CLV65x-0000 bar code scanner diminsional drawings



mm	inch
0.2	0.008
5	0.19
5.7	0.23
6.2	0.24
9	0.35
10	0.39
11	0.43
13.7	0.54
16	0.63
19.5	0.77
22	0.87
22.5	0.89
25.4	1.00
30.8	1.21
35.6	1.40
38	1.50
41.7	1.64
43.7	1.72
61	2.40
65.2	2.57
68	2.68
85	3.35
96	3.78

Fig. 10-20: Standard version: Dimensions of bar code scanners with front reading window (CLV65x-0000)

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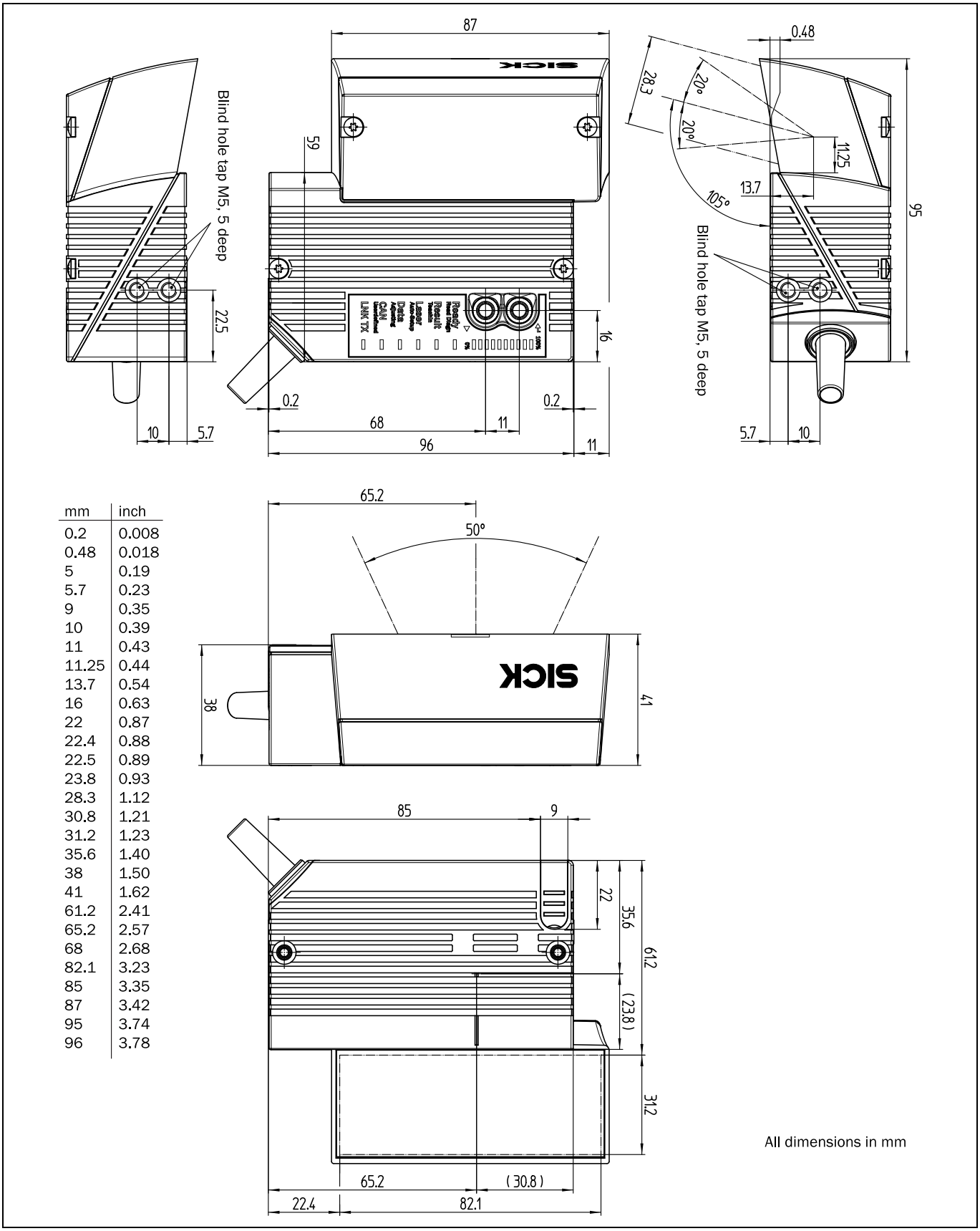
10.5.2 CLV65x-6000 bar code scanner diminsional drawings



mm	inch
0.2	0.008
0.48	0.018
5	0.19
5.7	0.23
9	0.35
10	0.39
11	0.43
11.25	0.44
13.7	0.54
16	0.63
22	0.87
22.4	0.88
22.5	0.89
23.8	0.93
28.3	1.12
30.8	1.21
31.2	1.23
35.6	1.40
38	1.50
41	1.62
61.2	2.41
65.2	2.57
68	2.68
82.1	3.23
85	3.35
87	3.42
95	3.74
96	3.78

Fig. 10-21: Standard version: Dimensions of the bar code scanner with oscilliating mirror (CLV65x-6000)

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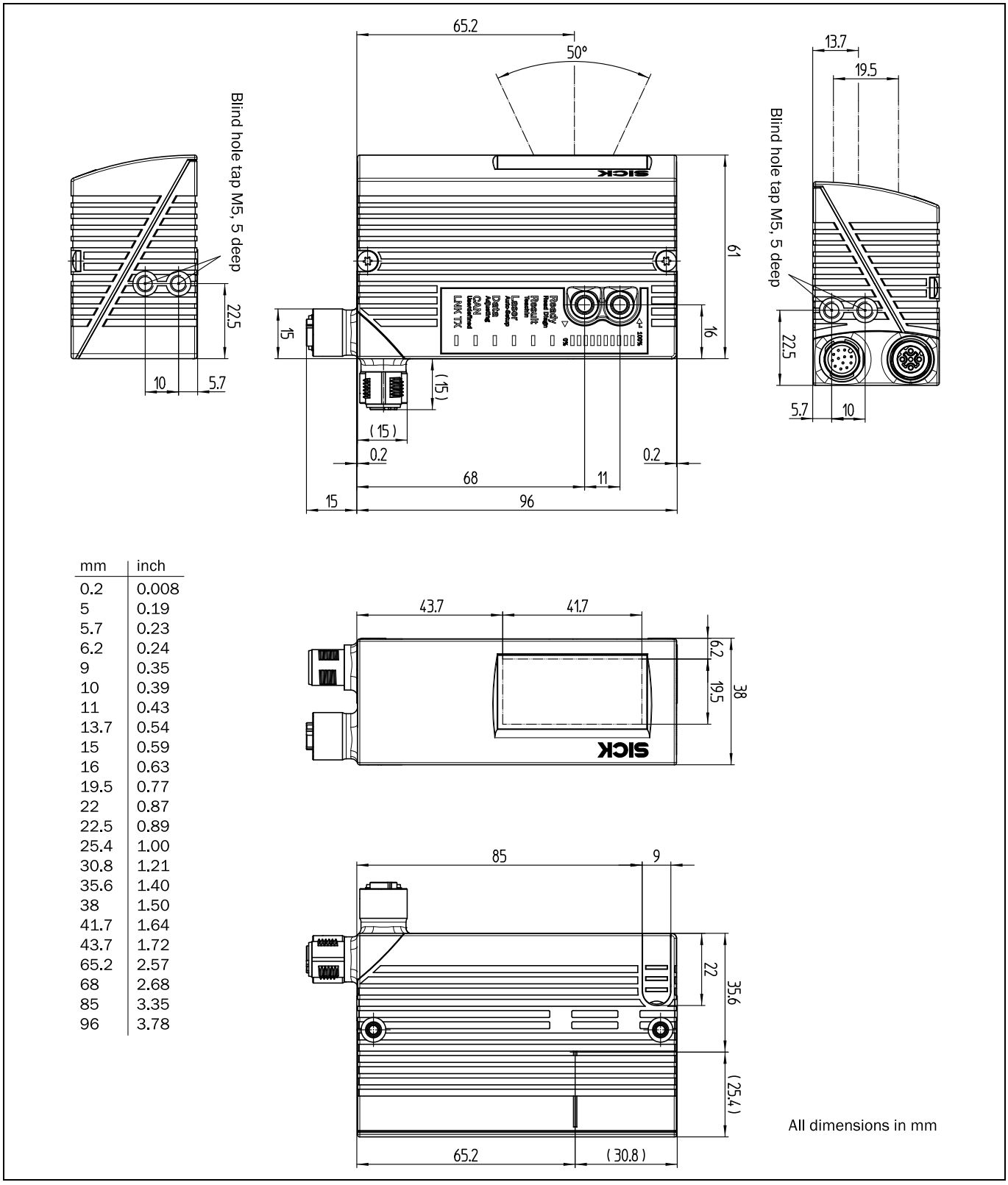
10.5.3 CLV65x-0120 bar code scanner diminsional drawings



mm	inch
0.2	0.008
5	0.19
5.7	0.23
6.2	0.24
9	0.35
10	0.39
11	0.43
13.7	0.54
15	0.59
16	0.63
19.5	0.77
22	0.87
22.5	0.89
25.4	1.00
30.8	1.21
35.6	1.40
38	1.50
41.7	1.64
43.7	1.72
65.2	2.57
68	2.68
85	3.35
96	3.78

Fig. 10-22: Ethernet version: Dimensions of bar code scanners with front reading window (CLV65x-0120)

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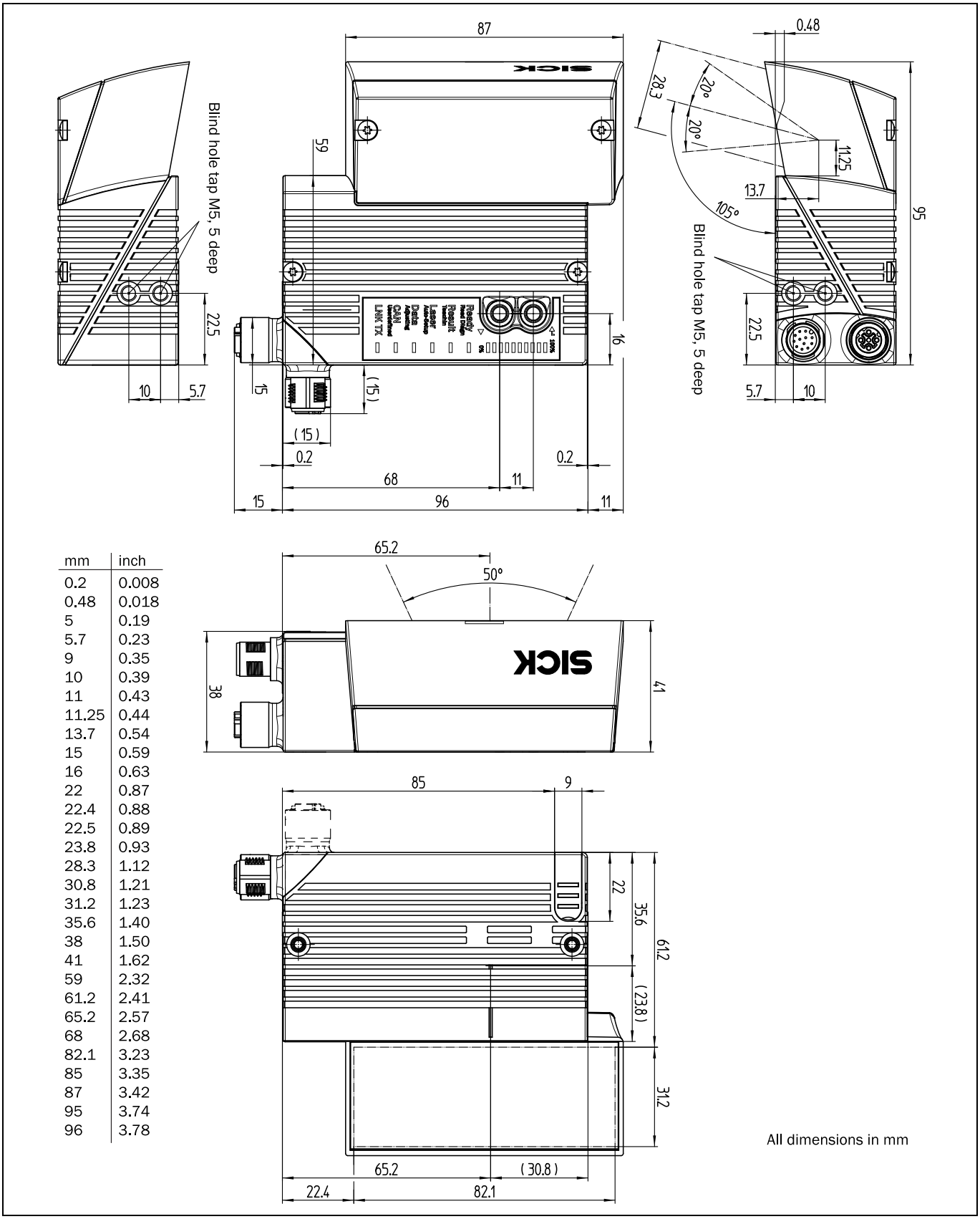
10.5.4 CLV65x-6120 bar code scanner diminsional drawings



mm	inch
0.2	0.008
0.48	0.018
5	0.19
5.7	0.23
9	0.35
10	0.39
11	0.43
11.25	0.44
13.7	0.54
15	0.59
16	0.63
22	0.87
22.4	0.88
22.5	0.89
23.8	0.93
28.3	1.12
30.8	1.21
31.2	1.23
35.6	1.40
38	1.50
41	1.62
59	2.32
61.2	2.41
65.2	2.57
68	2.68
82.1	3.23
85	3.35
87	3.42
95	3.74
96	3.78

Fig. 10-23: Ethernet version: Dimensions of the bar code scanner with oscilliating mirror (CLV65x-6120)

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11 Appendix

11.1 Appendix overview

The appendix contains the following additional information:

- Configuring the bar code scanner system with command strings
- Help table for calculating the code length of a bar code
- Supplementary documentation (overview)
- Glossary
- Copy of EC Declaration of Conformity
- Code samples of bar codes

11.2 Configuring the bar code scanner with command strings

As an alternative to the SOPAS-ET configuration software, the bar code scanner can also be configured and operated with command strings via all the data interfaces. The command strings can be displayed separately via the SOPAS-ET configuration software.

Important Both the command strings and the SOPAS-ET configuration software are based on command language which directly accesses the command interpreter of the bar code scanner. This command language must be used with care as the bar code scanner executes commands that are sent immediately. Parameter values altered via commands are at first only active in the current parameter set in the working memory (RAM) of the bar code scanner. To save in the permanent memory, the altered parameter set must be copied into the PROM using a special command, this ensures that the alterations are not lost when the power supply is switched off.

Command strings for triggering the reading pulse:

- START: <STX>sMN mTCgateon<ETX>
- STOP: <STX>sMN mTCgateoff<ETX>

If the commands are entered via the terminal emulator in the SOPAS-ET configuration software, the two control characters <STX> and <ETX> are omitted.

Connection to the bar code scanner when using the terminal emulator and Ethernet:

1. Select TOOLS/TERMINAL in the SOPAS-ET configuration software menu to call up the terminal emulator and in the terminal emulator, select CONNECTION/CONNECT to call up the connection assistant.
2. Select option USER DEFINED CONNECTION in the connection assistant and confirm by pressing NEXT.
3. Select option TCP/IP and confirm by pressing NEXT.
4. Select option SHOW ONLY COLA TELEGRAMS.
5. Enter the bar code scanner's IP address in the relevant field and confirm by pressing NEXT.
6. In the ADDRESSING MODE selection list, select BY NAME and confirm the settings by pressing CONNECT.

   The connection with the bar code scanner is established. The command strings can be transferred.

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11.3 Calculating the code length of a bar code

The code length of a bar code corresponds to the number of characters used in the print image, including the check digit (if available).

To scan (decode) a code, the code length must be put in using the SOPAS-ET configuration software. Depending on the bar code type, the code length can be calculated by counting the bars and spaces according to the relevant formula in the following table.

1. Determine the bar code type and count the bars or wide elements (bars and spaces), incl. start and stop characters according to the information in the following table.
2. Calculate the bar code length according to the relevant formula.
3. Enter the results via the SOPAS-ET configuration software, as shown in column 4 of the table.

Bar code type	**Count**	**Calculating the bar code length**[1)2)]	**Input the SOPAS-ET configuration software**
Code 39	Number of bars	$I_{Code} = \frac{\text{Number} - 10}{5}$	Calculated code length
2/5 Interleaved	Number of wide elements (bars and spaces)	$I_{Code} = \frac{\text{Number} - 1}{2}$	Calculated code length
EAN	n/a	13 characters (normal version)	Activate 13-digit
		8 characters (short version)	Activate 8-digit
UPC	n/a	12 characters (UPC A, normal version)	Activate version A
		6 characters (UPC E, short version)	Activate version E
Codabar	Number of bars	$I_{Code} = \frac{\text{Number} - 8}{4}$	Calculated code length
Code 128 (character set A)	Number of bars	$I_{Code} = \frac{\text{Number} - 10}{3}$	Calculated code length
EAN 128	Number of bars	$I_{Code} = \frac{\text{Number} - 10}{3}$	Calculated code length
Pharmacode	Number of bars	Number of bars	Number = code length

1) Check digit optional for code 39, 2/5 Interleaved, Codabar. Check digit is always integrated into the bar code print for EAN, UPC, code 128, code 93, EAN 128 according to the specification (automatically eliminated when the bar code scanner reading results are generated)

2) Apart from a few exceptions, every printed character represents an ASCII character which has to be decoded.
Extended for code 39. The number of characters in the bar code scanner's data string may be greater than the number of characters in the print image for code 93, code 128 and EAN 128, since they are made up of several character sets.

Tab. 11-1: Help table for calculating the code length of a bar code

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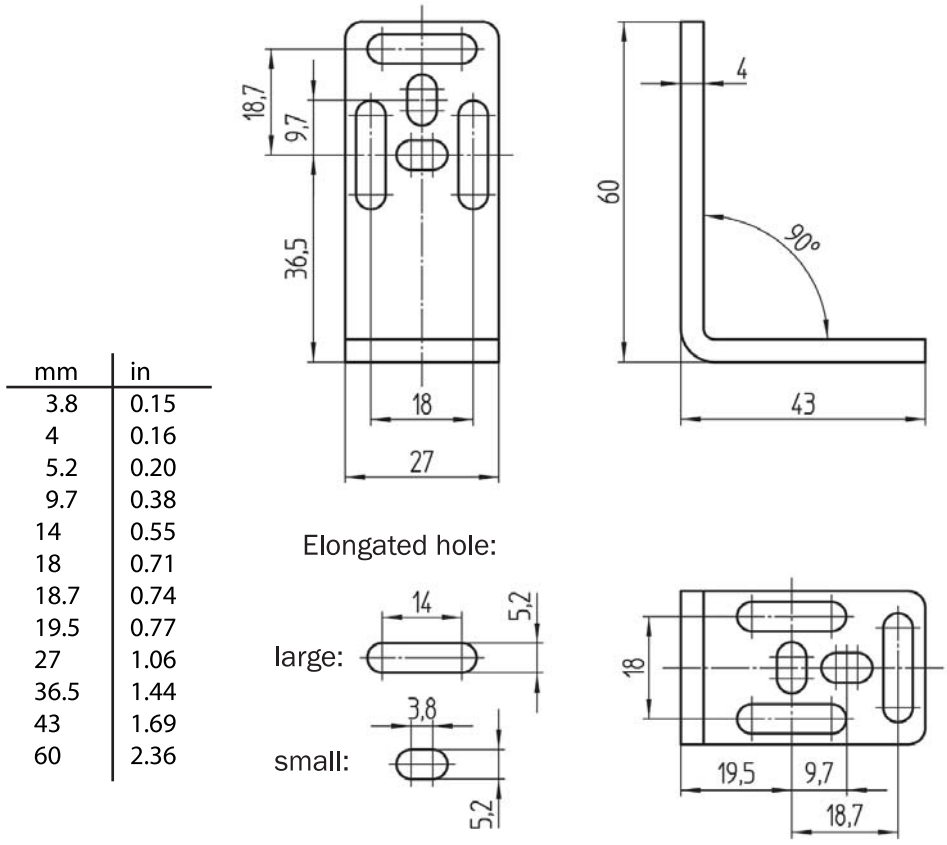
11.4 Dimensional drawing accessories

11.4.1 Dimensional drawing fixing bracket no. 2020410



mm	in
3.8	0.15
4	0.16
5.2	0.20
9.7	0.38
14	0.55
18	0.71
18.7	0.74
19.5	0.77
27	1.06
36.5	1.44
43	1.69
60	2.36

Included to fix the bar code scanner to the bracket:
2 x cylinder head screws M5 x 8 mm (0.32 in), with hexagon socket, self-locking

Fig. 11-1: Dimensions of the fixing bracket no. 2020410

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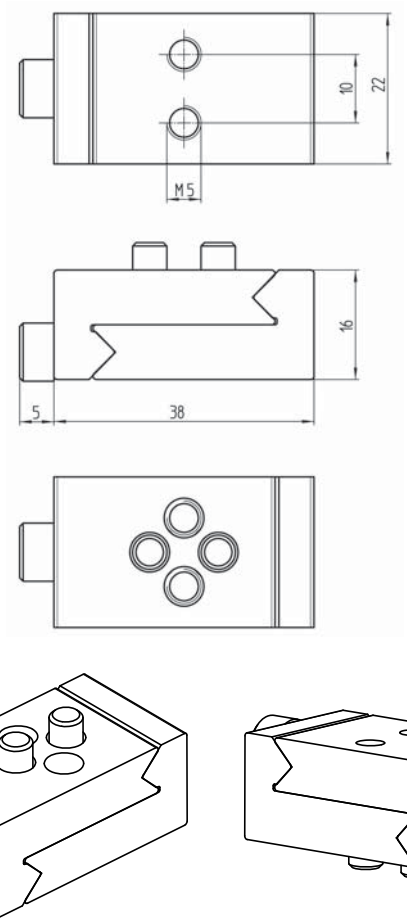
11.4.2 Dimensional drawing of quick release clamp no. 2025526

mm	in
5	0.19
10	0.39
16	0.63
22	0.87
38	1.50



Included to fix the bar code scanner to the clamp:
2 x cylinder head screws M5 x 8 mm (0.32 in), with hexagon socket, self-locking

Fig. 11-2: Dimensions of the quick release clamp no. 2025526

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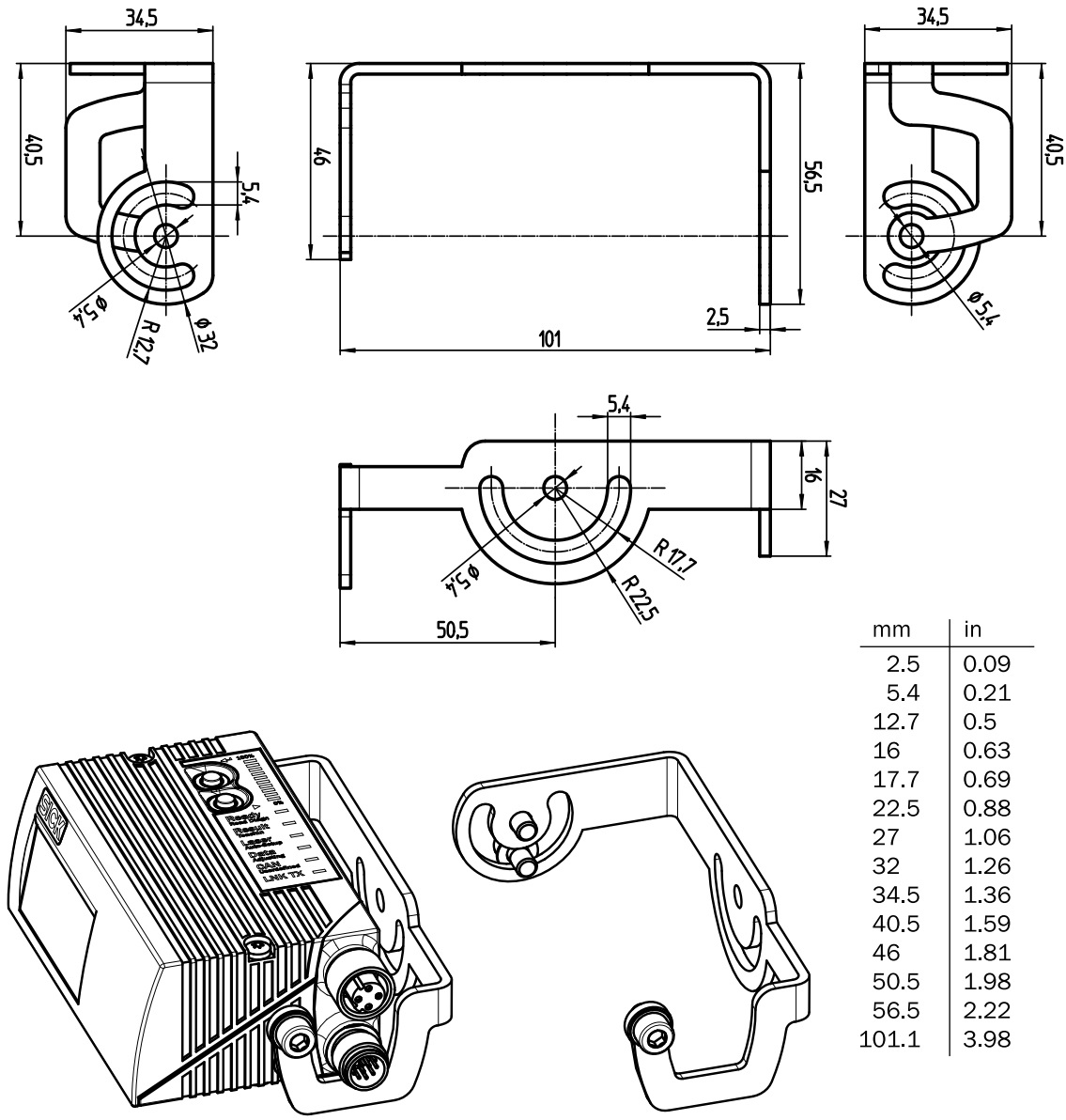
11.4.3 Dimensional drawing fixing bracket no. 2042800



mm	in
2.5	0.09
5.4	0.21
12.7	0.5
16	0.63
17.7	0.69
22.5	0.88
27	1.06
32	1.26
34.5	1.36
40.5	1.59
46	1.81
50.5	1.98
56.5	2.22
101.1	3.98

Included to fix the bar code scanner to the bracket:

- 3 x cylinder head screws M5 x 8 mm (0.32 in), with hexagon socket, self-locking
- 3 x spring washer A5

Fig. 11-3: Dimensions of the fixing bracket no. 2042800

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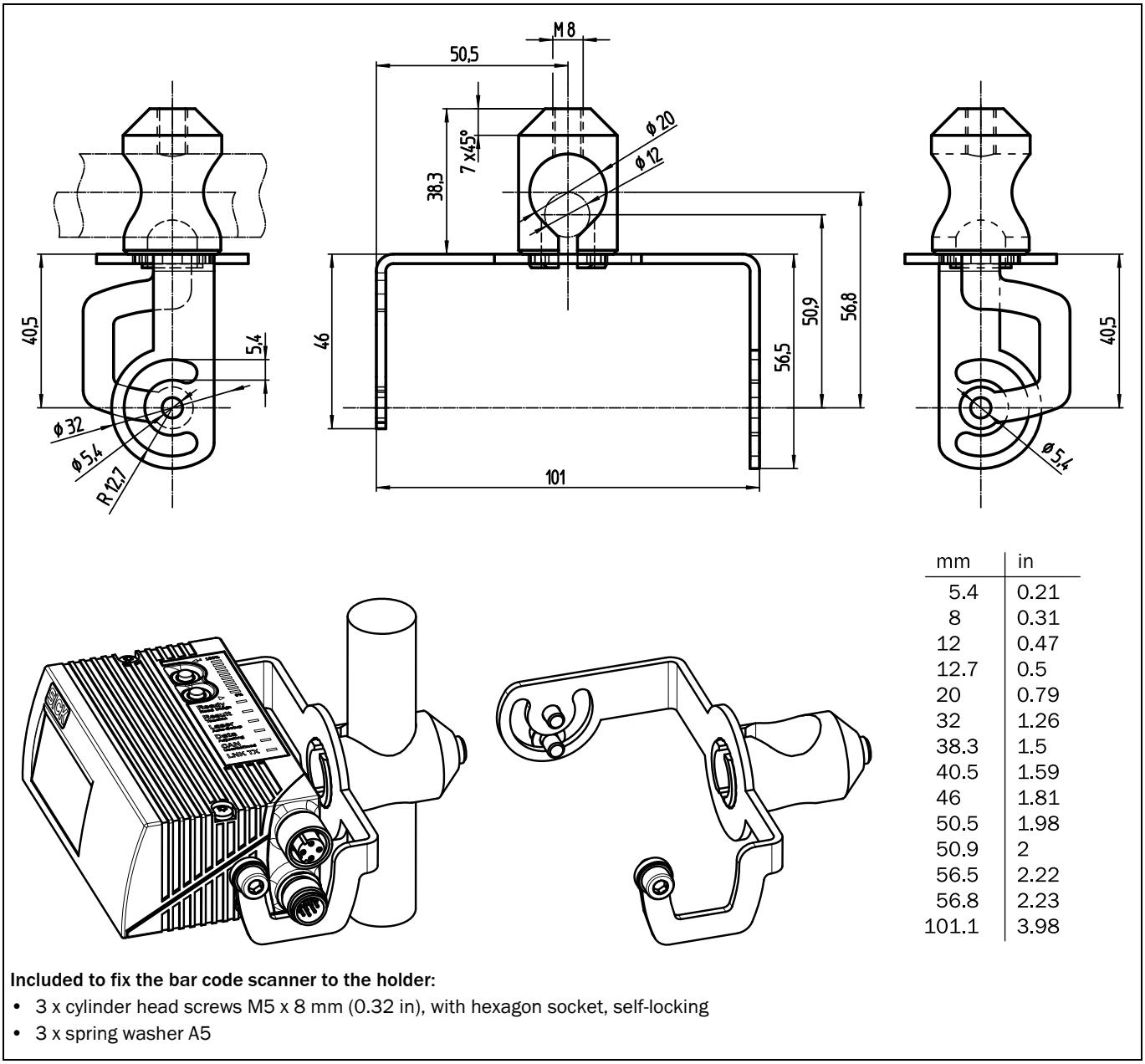
11.4.4 Dimensional drawing of round rod holder no. 2042801



mm	in
5.4	0.21
8	0.31
12	0.47
12.7	0.5
20	0.79
32	1.26
38.3	1.5
40.5	1.59
46	1.81
50.5	1.98
50.9	2
56.5	2.22
56.8	2.23
101.1	3.98

Included to fix the bar code scanner to the holder:

- 3 x cylinder head screws M5 x 8 mm (0.32 in), with hexagon socket, self-locking
- 3 x spring washer A5

Fig. 11-4: Dimensions of the round rod holder no. 2042801

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11.5 Supplementary documentation

Order no.	Title	Language	Contents
8013180	Fitting instructions "External mirror hood"	German/ English	Description how to install the mirror hood for light path reduction
8011945	"Bar code scanner CLV600" product information	English	Information on the bar code scanner and an overview of in-stock installation accessories, connection modules, cables and connectors, sensors for reading pulses as well as memory media
8012119	Operating instructions "Connection module CDB620“	German/ English	Description of the wiring for the bar code scanner with the host/PLC/sensor using connection module CDB620
8010004	Operating instructions "Connection module CDM420-0001“	German/ English	Description of the wiring for the bar code scanner with the host/PLC/sensor using connection module CDM420
8011155	Operating instructions "Connection module CDM420-0004“	German/ English	Description of the wiring for two bar code scanners with the host/PLC/sensor using connection module CDM420
8012120	Operating instructions "Parameter memory module CMC600“	German/ English	Description of operating the module in connection module CDB620 or CDM420
8010372	Operating instructions "Display module CMD400“	German/ English	Description of operating the module in connection module CDM420
8010365	Operating instructions "Power supply module CMP400“	German/ English	Description of installing the module in connection module CDM420
8010601	Operating instructions "Power supply module CMP490“	German/ English	Description of installing the module in connection module CDM420
8010462	Operating instructions "Field bus gateway CMF400-1x01 for PROFIBUS-DP“	English	Description of installing and operating (configuring) the module in connection module CDM420
8010464	Operating instructions "Field bus gateway CMF400-2101 for DeviceNet“	English	Description of installing and operating (configuring) the module in connection module CDM420
8012214	Operating instruction "Field bus module CDF600-0100 for PROFIBUS-DP"	English	Description of installation, operation and configuration
8009180	Operating instructions "Use of the CAN interface"	English	Description of setting up a CAN scanner network (electrical connection, configuring the bar code scanner, functions) and integrating it in a CAN open network

Tab. 11-2: Supplementary documentation

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11.6 Glossary

Also see the SOPAS-ET configuration software online help for further terms.

Distance detection

Device detecting in 2 graduation distances from objects carrying the bar codes. One example is the downward reading of a photoelectric reflex switch arranged beside the conveyor system. The ranges for focus position switching are defined through combinations of the switched input "Sensor 1" and the cross-reference list for distance configurations.

Distance configuration

Data set in the bar code scanner to establish a focus position of the laser beam for focus position switching. The depths of field for the individual focus positions can be obtained from the specification diagram in relation to the resolution.

Aspect ratio

For bar codes with the code height (strip length) to code length (number of characters) ratio.

Deflection range

Deflection of the scanning line by way of the oscillating mirror across the scanning direction to both sides of the central position CW=50 (corresponds to a light exit under 105 ° (default setting)). Also called oscillation amplitude.

Deflection angle

Angle which the scanning line covers at both sides each of the central position CW=50 (corresponds to 0 °) when deflected by the oscillating mirror. Also called oscillation angle.

Autofocus function

Ability of the CLV65x to detect the distance of the objects without external sensors in order to adapt the focus position to the object distance.

Aux interface

Logical auxiliary data interface of the bar code scanner with a fixed data output format, physically switched to RS-232 (Aux) and Ethernet (port 2111). With this data interface, access to the bar code scanner for the configuration is always possible with the PC and the SOPASET configuration software. The data interface is also used for diagnosis (output of reading diagnosis data or monitoring the data traffic on the Host interface). For the physical RS-232 interface, the following applies: fixed data format, data transfer rate 57.6 kbd. The data output to the PC via RS-232 can be switched off, existing Aux interface communication via the Ethernet interface (port 2111) remains active.

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Bar code

Field of dark strips (bars) and light spaces (elements) arranged in parallel, which, by working to a certain rule (specification), can be represented on the medium (subsurface) by various print processes. A user-readable (alpha)numeric character is produced from each machine-readable, corresponding number and combination of strips and spaces. Since the entire coded information, framed by start and stop characters, is available as a whole in one dimension and is also usually analysed by line, bar codes are also referred to as linear codes. The various code types differ in their codeable character inventory, design (number of elements per character, number of characters, start/stop characters, check characters), their information density and in their print tolerances. The length of the code strips and spaces has no bearing on the information content. However, longer code strips and spaces can be more easily analysed by the reading device.

User interface

Windows-oriented input interfaces in the SOPAS-ET configuration software for operation and configuration of the bar code scanner.

CAN interface

Physical data interface. Controls construction of a rapid SICK-specific CAN SENSOR network with various functions (e. g. multiplexer, master/slave). Access to the CLV65x bar code scanner for configuration is possible via the CAN interface (network) using the SOPAS-ET configuration software in remote mode.

Code geometry

Code length and height dimensions.

Data output string

A structured data telegram for the reading results in two independent data output formats that the bar code scanner itself prepares for output from its database. The output formats can be output via the Host interface to the physical data interfaces RS-232/RS-422/485, Ethernet or CAN. The design of the output formats is flexible (sequence of the code segments and elements, link with event conditions, filters, sorters etc.) and can be widely adapted to the application-specific requirements.

Decoder, decoding

From the code type-dependent analysis routine to reconstruction of the codes read in electronic form, in order to decipher the data content.

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Download

Transfer process of the parameter values using the SOPAS-ET configuration software from the PC to the connected bar code scanner.

In "Online" communication mode, the SOPAS-ET configuration software always transfers the just modified parameter values in the background automatically and temporarily to the working memory (RAM) of the bar code scanner with the "Immediate download" option (default setting). With this option, the current parameter values in the bar code scanner are constantly synchronised with the modifications that are made on the user interface.

With the "Download on request" option, the user is responsible for comparing them manually. If individual parameter values have unsynchronized statuses between SOPAS-ET and the connected bar code scanner, SOPAS-ET identifies these parameters with a blue frame. Using the context menu (right mouse button), if necessary the modified parameter value on a register tab (DOWNLOAD PARAMETER VALUE) can be transferred manually to the bar code scanner. Using the Communication menu, either modified parameter values only (DOWNLOAD MODIFIED PARAMETERS TO DEVICE) or all of the bar code scanner's parameter values (DOWNLOAD ALL PARAMETERS TO DEVICE) can be transferred.

The parameter values that were temporarily changed in the bar code scanner are only saved permanently when the storage option "Permanent" (CLV65x menu) is selected. The transferable parameter values depend on the current user level in SOPAS-ET.

Result status output

Adjustable function of the two independent switching outputs "Result 1" and "Result 2" of the standard version. Indicates either the status of the reading result (e.g. good read) or the fulfillment of a definable, event-dependent evaluation condition for the read operation (such as Match1). The outputs can also be switched off individually or together. The Ethernet version does not provide any switching outputs on its connectors. However, the function with two switching inputs can be accessed via connection module CDB620 in combination with the parameter memory module CMC600.

The "Result" LED is not coupled with one of the result outputs. It only shows status "Good read" for approx. 100 ms when generating reading results via the data interface.

Ethernet interface

Physical data interface with transfer rate 10/100 MBit/s and TCP/IP protocol. The Ethernet interface can be used alternatively to and also in parallel with the physical interfaces RS-232, RS-422/485.

Port 2112 (Host interface) is used to output the reading result and port 2111 (Aux interface) among other things is used to output reading diagnosis data and to monitor the data traffic on the Host interface. The bar code scanner can be configured using both ports. If the Aux interface data output via RS-232 is eliminated, existing communication via Ethernet remains active. The same applies to the Host interface, although the data output via Ethernet can be eliminated separately.

Error messages

Messages in coded form with which the bar code scanner displayed a diagnosed error. The bar code scanner differentiates between four error types: Information, Warning, Error, Fatal Error. The error messages can be displayed in the SOPAS-ET configuration software on the System Informationen register tab.

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No read format

Special, configurable output format for no reads in the data output string as a replacement for the output formats of a reading with fulfilled evaluation conditions. In its default setting, the bar code scanner displays the "NoRead" string as the no read format, framed by STX and EXT.

No read

The defined evaluation condition(s) were not met during the last reading pulse in the reading process.

Focus position

Distance of the lens focal point in front of the reading window. Can be adjusted via the lenses at the bar code scanner. The distance determines the DOF (depth of field) via the bar code scanner's lenses, in which the code can be analysed.

Focus position switching

The capability of the bar code scanner to shift the focus of the laser beam within a wide range on the reading level. Focus position switching is event-driven (e.g. through distance detection).

Function interfaces

Digital switching inputs and outputs of the bar code scanner.

Default setting

The factory default setting of all of the bar code scanner's parameter values is saved in its permanent memory and can be reloaded at any time when the device is connected using the CLV65x menu to the bar code scanner's working memory. This rejects all changes that were made in an application-specific configuration if they were not permanently saved in SOPAS-ET after the request. If necessary, the data connection to the bar code scanner itself is lost.

However, the application-specific basic setting enables all parameter values except for the communication parameter to be set to the factory default settings. The existing communication with the bar code scanner remains unaffected.

Good read

The defined evaluation condition(s) were successfully met during the last reading pulse in the reading process.

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Host interface

Logical main data interface of the bar code scanner with two independent, configurable data output formats. Allows, among other functions, the output of the reading result in telegram form to the host/PLC. Physically switchable to RS-232/RS-422/485 and Ethernet (port 2112) or CAN. Works as a gateway in conjunction with the SICK-specific CAN-SENSOR network. Provides various transfer protocols (except for CAN).

With the Host interface, access to the bar code scanner for configuration and diagnosis is always possible with the SOPAS-ET configuration software. The data transfer rate is 57.6 kbd in the default setting. The data output via RS-232/RS-422/485 can be switched off, existing Host interface data output via Ethernet remains active. However, it can be eliminated separately.

Increment management

Used in certain CLV65x applications to separate bar codes with identical contents that move during the reading procedure.

Command strings, commands

User interface to the bar code scanner, as an alternative to the SOPAS-ET configuration software. The command string form a clearly structured command language for changing the parameter value sets in the bar code scanner online. Directly accesses the command interpreter of the bar code scanner. Use of the host requires a corresponding programming task. The SOPAS-ET configuration software is based on the command strings.

Configuration file

Project file for the SOPAS-ET configuration software in which either only one complete parameter value set for a device or, if several devices are grouped into one project, the complete parameter value set for each device, is saved for archiving on the PC. The project file can be printed as a table, transferred to the Windows clipboard or provided as a PDF.

Reading range (DOF)

Depth of field at both sides of the lens focal point at the reading level. The size of the range depends on resolution and reading distance.

Reading diagnosis data

Code-, object- or device-related data which the bar code scanner derives directly from the reading process. The data allows, among other things, an assessment of the reading quality and to draw conclusions on the reading process.

Reading result

Electronic display and output of the data contents of the scanned bar codes together with reading diagnosis data in a data output string at the defined output time.

Reading field

In start/stop mode the reading field is the area between the start and stopp sensors for the reading pulse in conveyor direction.

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Reading pulse

Triggering of the internal reading gate via a bar code scanner-external pulse is carried out by means of an external trigger source such as a photoelectric reflex switch or a command string via the data interface. With internal trigger source "automatic tick", the bar code scanner creates the reading pulse itself.

Reading gate, reading interval

Time window in which the bar code scanner switches on the scanning line and attempts to recognise valid bar codes from the read information. The reading gate can be shorter than the external reading pulse, depending on the output mode of the selected reading result.

Reading angle (RA value)

The reading angle from the reading window to the red scanning line of the scanning beam under which the middle of a bar code is detected. Recorded by the bar code scanner for each scan and used, e. g., for the separation of bar codes with identical data contents. For the decoding process, the active analysis area along the scanning line can be restricted application- specifically by presetting the minimum and maximum RA values.

Line scanner

Scanner that uses a polygon mirror wheel with paraxial mirrors to deflect a focused laser beam extremely fast. As a result, it creates a light spot in the reading plane that moves along a straight line, which appears to the naked eye as a stationary scan line.

Line scanner with oscillating mirror

Line scanner that also deflects the laser beam about a central position, on both sides and perpendicular to the san direction using an oscillating mirror. By doing so, the bar code scanner can search for bar codes in larger areas. In addition to basic deflection to the maximum oscillation amplitude, optimum oscillating mirror functions are also possible.

Master/Slave configuration

Special arrangement and technical circuit connection of several bar code scanners to one reading station (e.g. multi-side reading) using the CAN interface. Via the master the combination acts on the host as just one device.

Multi-reading

Selectable number of readings which must each deliver internal results from one and the same bar code before the bar code scanner generates the reading result.

Aperture angle α

Aperture within the boundaries of which the bar code scanner is able to detect codes (through the lenses). A V-shaped area appears radially in front of the reading window, at right angles to the conveyor system (reading from above), in which the codes to be read must be positioned.

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Parameter value set

Data set which is used to initialise and activate the implemented functions of the bar code scanner. Transferred using the upload (all parameter values only) or download from the bar code scanner SOPAS-ET configuration software or vice versa.

Oscillating mirror reversal point

Point of deflection the oscillating mirror is at in which a reversal of direction takes place. This point can be used to trigger the focus position switching for low-speed applications (search function).

Sending point

Output time of the reading result in relation to the start of the reading pulse and the fulfilled evaluation conditions.

$SMART_{620}$ decoder

Specially developed decoder for reading bar codes with bad or soiled print images.

SOPAS-ET

PC configuration software, to run on Windows 2000™, XP™ and Vista™. Used for online communication with the bar code scanner in the dialog (configuration, displaying reading events, diagnosis) as well as for preparatory offline configuration of stand-alone devices or the grouping of the same/different SOPAS-ET-compatible SICK devices in a project. The parameters are exchanged device-specific with the bar code scanner/the devices via upload and download.

SOPAS-ET help

Online help which supports use of the SOPAS-ET configuration software. The parameter functions of the bar code scanner are explained in the online help. Runs using an HTML browser, such as "Internet Explorer™", and can be called up in the SOPAS-ET configuration software.

Saving to the bar code scanner

The application-specific parameter set can be stored in the bar code scanner either temporarily or permanently. In the case of temporary storage, the parameter set is only contained in the temporary working memory (RAM) and is lost as soon as the power supply is switched off. In the case of permanent storage, the parameter set is also transferred to the bar code scanner’s permanent memory and saved as a current data set after switching off. The default setting is deposited in a fixed, Read Only Memory (ROM) irrespective of this.

Specification diagrams

Diagrams showing the depth of fields (DOF) depending on resolution for a predefined focus position.

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Start/Stop operation

In this reading operation mode, only one object per reading pulse is located in the reading area. Two external sensors or command strings control the beginning and end of the reading pulse for the bar code scanner (stand-alone device). The length of the reading area is determined in this case by the distance of both reading pulse sensors for the start (beginning of the reading area) and stop (end of the reading area). The minimum reading distance between two objects must always be greater than the length of the reading area.

In the case of combined use with other bar code scanners in a master/slave combination (e.g. unidirectional double-side reading), the bar code scanner as a slave receives its pulse signals from another bar code scanner (master). The bar code scanners are networked via the CAN interface, the output of the master's reading result via its RS- 232/RS-422/485 interface and/or the Ethernet interface.

Pine tree effect

This effect of the line scanner with oscillating mirror is a result of the limits set by the active scan line range and the oscillation amplitude (CW value). Hence a "sharp window" of the same size can be generated in the reading field for every distance configuration for any read distance.

Teach-in

Method of programming the information required to adjust the CLV65x to the reading application in Parameterization mode.

Example: teaching in the background for the Autofocus function, also known as a distance profile.

Switching sequence

Sequence of the focus positions to be adjusted one after the other with the corresponding depths of field. For this purpose, the numbering of the active distance configurations is entered in the cross-reference list in the desired position.

Upload

Transfer process of all parameter values from the connected bar code scanner's working memory to a PC in the SOPAS-ET configuration software for display and modification. This is achieved when the device is connected and communication is successfully carried out after the scanning process for a confirmed request to synchronise the user interface and the bar code scanner. Where necessary, this can be triggered manually in the Kommunikation menu (UPLOAD ALL PARAMETERS FROM DEVICE Parameter values must be represented in the register tabs before the current parameter value set can be modified.

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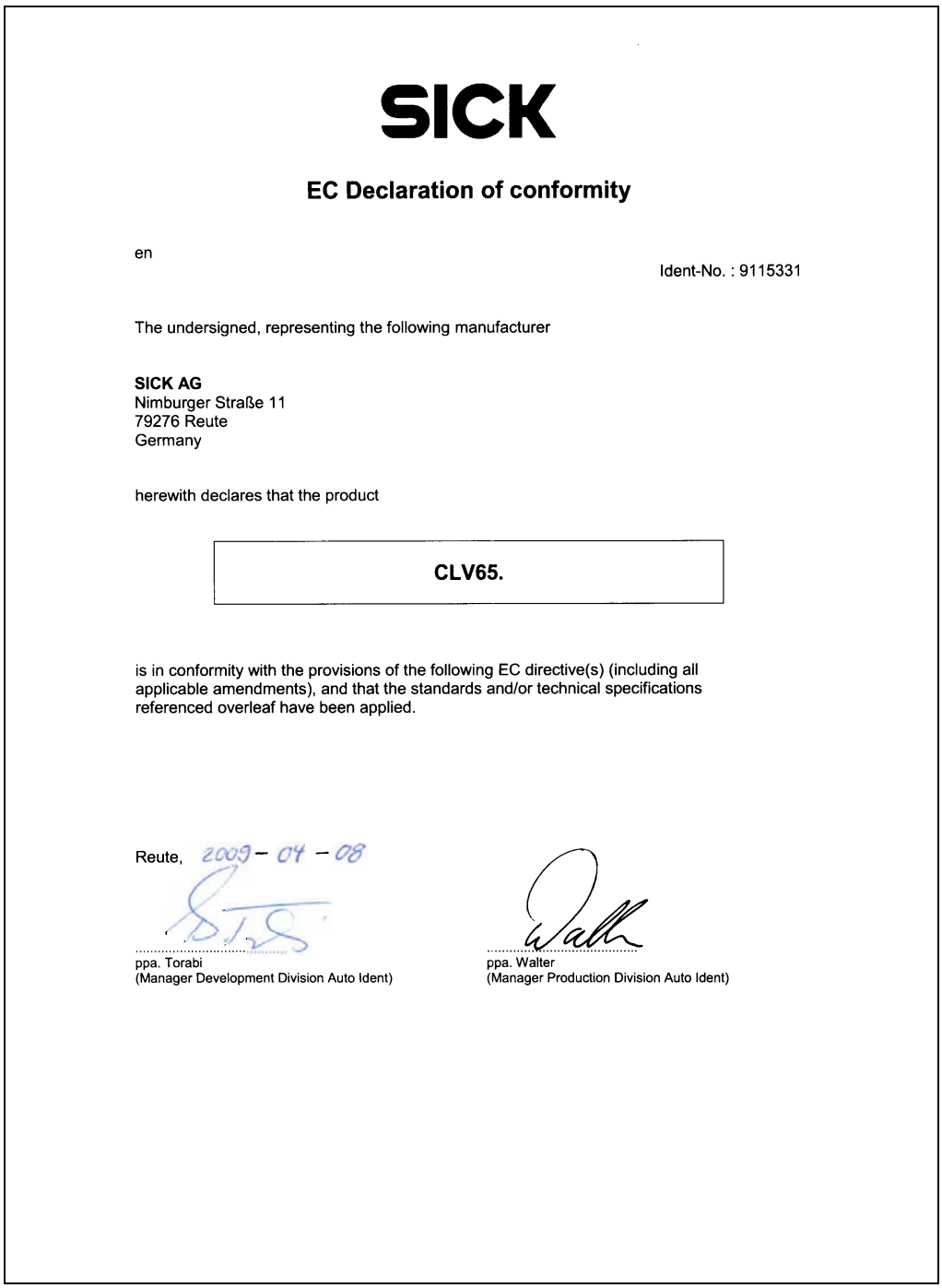
11.7 EC Declaration of Conformity

The figure shows a scaled down version of the EC Declaration of Conformity (page 1) for the CLV65x bar code scanner.

➢ The complete EC Declaration of Conformity and the list of device versions and the standards met can be requested from SICK AG.



SICK

EC Declaration of conformity

en

Ident-No. : 9115331

The undersigned, representing the following manufacturer

SICK AG
Nimburger Straße 11
79276 Reute
Germany

herewith declares that the product

CLV65.

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced overleaf have been applied.

Reute, 2009 – 04 – 08

ppa. Torabi
(Manager Development Division Auto Ident)

ppa. Walter
(Manager Production Division Auto Ident)

Fig. 11-5: EC Declaration of Conformity for the bar code scanner (page 1, scaled down version)

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11.8 Code samples of bar codes (selection)

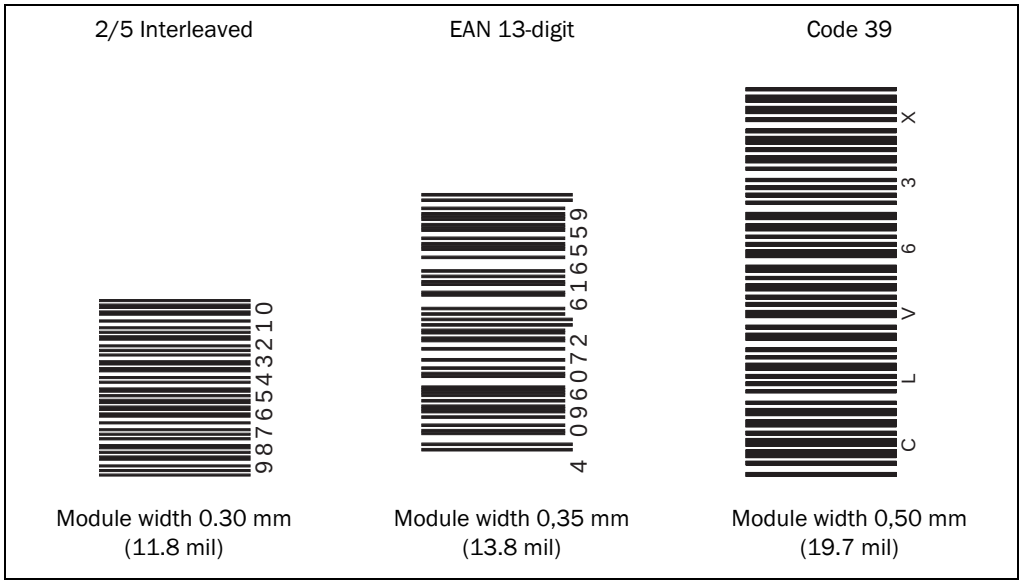

Fig. 11-6: Code samples of bar codes of various module widths (print ratio 2:1)

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